# ESSAYS ON CONSUMPTION RISK-SHARING IN EMERGING ECONOMIES

A Dissertation

Presented to the Faculty of the Graduate School

of Cornell University

in Partial Fulfillment of the Requirements for the Degree of

Doctor of Philosophy

by

Samreen Malik

August 2012

ESSAYS ON CONSUMPTION RISK-SHARING IN EMERGING ECONOMIES

Samreen Malik, Ph.D.

Cornell University 2012

This dissertation contributes to the growing literature of international finance on capital market integration and consumption risk sharing in emerging economies. I identify threshold effects in terms of financial market integration to demarcate regimes with varying extent of international risk sharing in emerging economies. In Chapter 2, I study a model of a small open economy to see how default decisions affect incentives for international consumption risk-sharing based on varying levels of debt to capital ratio in emerging economies while in Chapter 3, I employ a novel endogenous threshold identification method developed by Hansen (1999) for balanced panels, to empirically identify threshold effects of capital market integration on consumption risk-sharing in emerging economies. Finally in Chapter 4, I study the determinants of the capital market integration via level and composition of foreign assets held by emerging economies, exploiting temporal and cross-sectional variation in a panel data set of 37 emerging economies from 1970 - 2007.

## BIOGRAPHICAL SKETCH

Samreen Malik was born on March 5th, 1984, in Lahore, Pakistan. She completed high school at University College Lahore and then recieved Bachelor of Science (Honors) and Master of Science in Economics from Lahore University of Management Sciences in Lahore, Pakistan. She began her graduate studies in the PhD program at Cornell University in Fall 2008. Prior to the completion of her PhD, Samreen received a Master of Arts degree in Economics from Cornell University in Fall 2011.

*Bismillah hir-Rahmaan nir-Raheem*

*Hasbi Allahu wa nemal wakil.*

To my mother Uzma Ishaque and my father Basharat Ullah Malik

## ACKNOWLEDGEMENTS

I am grateful to my special committee, Nancy Chau, Viktor Tsyrennikov and Eswar Prasad, for all of their advice, time and patience during my graduate studies at Cornell University. They have challenged me and supported me throughout this journey, and I am infinitely grateful for the guidance they have given me along the way. It has been my honor and pleasure to be one of their students. I would also like to thank Karel Mertens for his insights and advice on my research.

I have also benefited from numerous discussions with colleagues and mentors in my time as an undergraduate and graduate student, and I would especially like to acknowledge the influence of Faisal Bari, Turab M. Hussain, Naoko Ida, Grace Gu, Ahmed Jaber, Mohammad Kazim, John Owsley, M. Kemal Ozbek and Ying Wang.

I am also grateful to all of my family for their support and company, especially Hermine, Benedikt and Tayyab. I am especially thankful to my sister Beenish and my brother Mohammad, from whom I have learned so much about myself and the world; and my parents Uzma and Basharat, without whose encouragement this dissertation would not have been possible. Finally, I want to thank my husband Maximilian for his inspiration, love and friendship. It is my greatest fortune to have him in my life. Alhamdulillah.

## TABLE OF CONTENTS

## LIST OF TABLES

## LIST OF FIGURES

CHAPTER 1

# INTRODUCTION

## 1.1 Background

Over the past 20-30 years, a significant group of developing economies – often referred to as "emerging market economies" – have undertaken substantial market-orientated reforms, and opened up their national economies to international trade and capital flows.[1] The rising importance of emerging market economies in the global economy is due in part to the rapid growth rates they have been able to achieve since beginning the process of international integration, as well as their ever growing share in international output, trade and capital flows.

A central component in the integration of emerging economies into the global economy has been the removal of restrictions on capital flows to attract international capital (referred as capital inflows) and stimulate domestic investors to accumulate international assets (referred as capital outflows). Despite the fact that financial flows to and from emerging economies have increased dramatically as a result of the opening up of capital markets, the consequences of financial liberalization remain contentious and are a continued area of academic study. Proponents of capital market liberalization in emerging economies can justify their position with basic theoretical arguments. Greater financial openness should – in theory – facilitate a more efficient allocation of capital

[1] Categorization of countries as *emerging economies* is based on income limits, but these calculation can change from year to year which may result into a given country qualifying under the legislative and administrative criteria one year as emerging economy but not the next year. The World Bank, IMF and other international institutions have not established a fixed list of emerging market countries. In this dissertation I use a conventional definition of emerging economies commonly followed in the existing literature. In particular, the list of emerging economies used in this dissertation is based on the country being categorized as emerging market in either one of the following indexes: Columbia University EMGP List; FTSE list; MSCI list; S&P list; Dow Jones list; Frontier Strategy Group (F10) list; BBVA Research and Emerging Markets Index.

across borders, to the benefit of capital scarce developing economies. Moreover, financial linkages should, in principle, promote international consumption risk-sharing between countries through one of at least two possible channels: (1) Income risk-sharing, achieved when the income flows from foreign asset holdings delink a country's income growth rates from the domestic output growth rates, and/or (2) consumption smoothing achieved through international borrowing and lending *ex-post* to the realization of short-term idiosyncratic output shocks. Although these are distinct mechanisms for decoupling domestic consumption growth rates from output growth rates, both should result overall in reduced correlations between domestic consumption volatility and domestic output volatility, and an increased correlation between domestic and global consumption growth rates that provides smoother consumption by reducing the dependence of domestic consumption growth on country-specific components of output shocks.

Despite the possibly large welfare gains associated to increased consumption risk-sharing by emerging economies, the empirical evidence suggests that financial market integration has not increased consumption risk-sharing in emerging economies by nearly as much as the basic theoretical models would predict.[2] This is in contrast to industrialized countries where risk-sharing is still not perfect, but seems to have improved noticeably with the integration of financial markets over the past two decades. For example, Kose et al. (2009) show that capital account liberalization has had insignificant or negative effects on consumption risk-sharing in emerging economies. This is in contrast to industrialized economies, where they find that consumption risk-sharing remains imperfect but has improved noticeably with financial market liberalization. Flood et al. (2009) and Yeyati and Williams (2011) use alternative measures of consumption risk-sharing

[2]See, for example, Kose and Prasad (2010, Chapter 6) and the references therein for an overview of recent literature documenting the divide between theoretical predictions about financial market liberalization and the empirical evidence on consumption risk-sharing by emerging economies. Imbs and Mauro (2007) provide a detailed analysis of the potential welfare gains from consumption risk-sharing in emerging economies. In general they find that perfect consumption risk-sharing would lead to a welfare gain equivalent to a permanent 3-4% point increase in domestic GDP.

but also find significant differences between industrialized and emerging economies in terms of the response of consumption risk-sharing to financial market integration.[3]

Given that consumption risk-sharing even amongst industrialized countries remains far from perfect, it is not surprising that emerging economies have not reaped all of the potential welfare gains of capital market integration in terms of smoother domestic consumption. However, the puzzling aspect pointed out by the existing literature is that liberalization of domestic capital markets does not seem to have even improved consumption risk-sharing in emerging economies at all. Based on the theory of the second best, a number of authors have long argued that it should not come as a surprise if capital market liberalization does not lead to the consumption risk-sharing benefits anticipated by standard, complete market models of the economy; especially in emerging economies where capital markets are still relatively underdeveloped and other institutions are still in transition towards a market orientated economy. As a result, identifying exactly what impediments and challenges are central for emerging economies as they open up to international capital flows is a central ongoing topic of research.

## 1.2 Overview of the Dissertation

This dissertation contains three chapters that contribute to our understanding of the limited consumption risk-sharing achieved by emerging economies in the wake of financial

[3] Sorensen and Yosha (1998) argue that improved consumption risk-sharing in industrialized countries is largely due to increased diversification of capital ownership. For example, in a study of European economies, Demyanyk et al. (2008) show that membership of the EMU has significantly increased cross-border investments, and led to marked improvements in consumption risk-sharing across EMU member states. Asdrubali et al. (1996) find similar effects of interstate investment within the US. Obstfeld (1994a) also show that among the G-7 countries there has been a marked tendency for domestic consumption to become more closely correlated with world consumption over the period 1951 – 1988, and they attribute this decoupling of domestic consumption from domestic output volatility to increased cross-border diversification of capital.

globalization over the past 20 years. Chapter 2 presents a theoretical model that links limited risk-sharing to another salient feature specific to emerging economies, namely, the presence of default risk on external debts. Chapters 3 and 4 investigate different empirical predictions of the the model in Chapter 2, and further illustrate potential sources of the lack of consumption risk-sharing in emerging economies.

In Chapter 2, I study a model of a small open economy to see how default decisions affect incentives for international consumption risk-sharing. Default risk is a central aspect of the transitional nature of emerging economies, that distinguishes them substantially for industrialized countries. In fact, over the past 20-30 years there have been more than 80 sovereign default event in emerging economies, compared to none in industrialized countries; and it has only been with the very recent default concerns in the EU that default risk has featured prominently outside of the analysis of emerging markets.

Chapter 2 illustrates that this feature of emerging economies is important for understanding the asymmetric response of emerging economies to capital market integration. The model is based on a simple economic intuition. Risk-sharing reduces the exposure of domestic consumption to country-specific productivity shocks. However, default decisions have an option value which comes from the randomization over *ex-post* default regimes, and therefore depends on the exposure to shocks. I show that this inherent trade-off can lead to endogenous risk-*taking*: Even if the country is risk-averse and full insurance against productivity shocks is possible, the optimal plan may keep consumption volatile because of the option value of default. I relate the value of the default option to the external debt to capital ratio, and demonstrate threshold effects that determine whether risk-sharing or risk-taking is optimal. The qualitative implications of the model are consistent with the lack of consumption risk-sharing, history of serial default

and heterogeneity in international diversification observed in emerging economies.

A central empirical prediction of the model in Chapter 2 is that consumption risk-sharing may be subject to threshold effects. Even in the absence of formal models to illustrate where such thresholds come from, the existing empirical literature has often pointed to the possibility that threshold effects could help to explain the limited consumption risk-sharing in emerging economies (see, e.g., Kose et al., 2003, 2007). In Chapter 3, I therefore employ a novel endogenous threshold identification method developed by Hansen (1999) for balanced panels, to identify threshold effects of capital market integration on consumption risk-sharing in emerging economies. In a panel data set covering 25 emerging and 20 industrialized economies from 1985-2007, I show that for all types of capital inflows, except foreign portfolio investments (FPI), there are generally three regimes. At low levels of integration consumption risk-sharing is negligible. At high levels of integration, consumption risk-sharing remains imperfect but is statistically and economically significant. However, intermediate to these regimes, capital inflows lead to negative risk-sharing (suggesting that capital flows are pro-cyclical and therefore increase volatility in consumption growth rates relative to volatility output growth rates). The results indicate that part of the reason why emerging economies have achieved limited risk-sharing despite opening up to international capital flows, may be that they have not yet achieved enough *de facto* capital market integration.

Furthermore, the previous chapter also shows that threshold identification is not very prominent when financial assets are used for *de facto* capital integration measure. This indicates that one potential reason could be that the levels and fractions to GPD ratios of foreign assets are much smaller and hence confidence intervals for such threshold effects seem very wide. However, in the recent years, there has been an increase in the foreign asset accumulation by these economies and the literature does not directly explores the

determinants of the total assets and different classes of foreign assets from emerging economies point of view. Given the strong link between foreign assets and consumption risk-sharing (see, e.g., Demyanyk et al., 2008), in Chapter 4 of the dissertation, I therefore study the determinants of the level and composition of foreign assets held by emerging economies, exploiting temporal and cross-sectional variation in a panel data set of 37 emerging economies from 1970 - 2007.

As emerging economies become an increasingly important source of foreign investments in the world economy, the empirical results of Chapter 4 point to a number of stylized facts that may help to understand and motivate future research on the patterns in the large time and cross-sectional variation of foreign investments from emerging economies. Focusing on the affect of domestic macroeconomic, institutional, financial and trade factors on all asset types, I find evidence for significant positive effects of trade openness and financial depth on all three asset types, and evidence for negative effects of external debt and exchange rate volatility. However, there are also important differences between the different asset classes over time and over different groups of countries. In particular, I find stylized evidence for the theory that FPI was driven largely by capital flight prior to 1990, though much less so after 1990. Foreign direct investments (FDI) and foreign exchange reserves (FX), on the other hand, seem to have been driven much more by standard portfolio considerations. Further, the analysis also highlight that total assets behave very similarly in industrial and emerging economies while stark differences are present for FPI and FX in these economies.

Overall the dissertation highlights that although many emerging economies are on high growth trajectories and offer great opportunities for investors from stagnating industrialized countries, they also face unique challenges with regards to the development of institutions to stabilize the macroeconomic environment and assimilate rising capital

flows. The apparent inability of greater capital market liberalization and integration to manifest in improved consumption risk-sharing is, according to the analysis in this dissertation, in part due to the ongoing nature of the general transition from underdeveloped to advanced economy. Using theoretical models and empirical methods to understand trade-offs and challenges in emerging economies, the dissertation therefore informs both policy making in emerging economies where capital market liberalization remains contentious, as well as policy making in industrialized economies who are grappling with the changing role of emerging economies in the increasingly global financial market.

CHAPTER 2

# A MODEL OF RISK-SHARING AND DEFAULT IN EMERGING ECONOMIES

## 2.1 Introduction

Financial liberalization was supposed to lead to greater consumption risk-sharing by emerging economies. On balance, the empirical evidence suggests that it hasn't. Risk-sharing remains imperfect for industrialized countries as well, but there is a general consensus that it has improved with greater integration of financial markets (Obstfeld, 1994a). The surprising finding from recent empirical studies (e.g., Kose et al., 2009; Flood et al., 2009; Yeyati and Williams, 2011) is that risk-sharing by emerging economies has – on average – not improved at all with financial globalization. In fact, it may have become worse.

In this paper I study a model that leads to new insights about the lack of international consumption risk-sharing. Consumption risk-sharing refers to the ability of a country to exploit international market linkages to decouple domestic consumption growth from idiosyncratic components of output volatility.[1] The objective of the analysis in this paper is to show how a particular channel for consumption risk-sharing – the international diversification of capital – interacts with another public policy variable, namely the decision about whether to service or default on external debt obligations. I highlight an inherent trade-off through which domestic control over default decisions reduces incentives for risk-sharing and can, in fact, lead to risk-*taking*. I also relate the qualitative implications of the model to empirical observations on risk-sharing, credit-risk and de-

[1]Consumption risk sharing can generally be attained either by *ex-ante* income risk sharing (through international capital diversification) or by *ex-post* consumption smoothing (through lending and borrowing). In this paper, I use the former channel of risk sharing which smoothes income prior to the realization of the shock and results in a smoother consumption thereafter.

fault in emerging economies.

In order to focus on the feedback from default to risk-sharing decisions, I keep the risk-sharing problem in the model abstract and simple. There is a single country with a risk-averse representative agent. The country borrows in international capital markets in period 1, and also has the opportunity to hedge against productivity shocks by investing a share of capital in a negatively correlated foreign sector. There are no barriers to capital and so full insurance against productivity shocks is possible, and would also be optimal in the absence of default decisions. I then study the optimal plan when there is an option to default in period 2, *ex-post* to the realization of productivity shocks. In the absence of risk-sharing, consumption in period 2 is volatile and default may be optimal *ex-post* in some states but not others. This implies that default has an option value. The optimal policy depends on how the potential benefits of risk-sharing relate to the potential option value of default. The latter, in turn, depends on the external debt to capital ratio, which is determined by borrowing and capital accumulation decisions in period 1. I show that:

- For a country with a low external debt to capital ratio, the potential benefits of diversification outweigh the potential value of the default option. The country therefore shares its consumption risks, investing appropriately in the foreign sector to fully decouple domestic consumption in period 2 from domestic output. Hence, while domestic output is stochastic, consumption is constant across states. Since consumption in period 2 is not random, default is never exercised and has no option value.
- For a country with a higher debt to capital ratio, the potential option value of default is greater than the potential benefits of diversification. The country therefore does not share consumption risks, and domestic output and consumption in period 2 remain volatile and perfectly correlated. The country services debts when

the productivity shock is good, and defaults when the productivity shock is bad. The exposure to productivity shocks induces a randomization over default regimes which has an option value. It is the option value that makes risk-taking optimal.

There is a simple underlying intuition for the trade-off between risk-sharing and default. International diversification facilitates consumption risk-sharing by hedging against country-specific productivity shocks. The option value of default is related to the randomization over different *ex-post* default regimes. Since risk-sharing reduces exposure to productivity shocks, it curtails randomization and decreases the option value. On the other hand, default exposes foreign assets to repossession (a direct default punishment) and therefore reduces the value of diversification. The option value of default and benefits of risk-sharing are therefore interdependent. However, to find an optimal plan it is sufficient to compare the *potential* option value of default (in the absence of risk-sharing) and the *potential* benefits of risk-sharing (in the absence of default). These potential benefits are determined by the external debt to capital ratio, and this leads to the threshold effects for risk-sharing and risk-taking.

One complicating factor that this logic does not take into account, is that the debt to capital ratio depends on the borrowing and capital accumulation decisions in period 1. These, in turn, generally depend on whether risk-sharing or risk-taking is optimal. I circumvent this problem by first looking at a basic model in which international borrowing is subject to an exogenous collateral constraint. I assume that technologies are linear and that the expected productivity in the open economy exceeds the international cost of capital. The first assumption is a simplification, the second has a clear empirical basis for capital scarce emerging economies. The capital accumulation and risk-sharing decisions are then still related, but the two assumptions imply that the collateral constraint binds at an optimal solution, and so the external debt to capital ratio is independent of

other decisions. As a result, threshold effects for risk-sharing and risk-taking can be found by preforming comparative statics in terms of the exogenous collateral constraint.

Finally, in an extension of the basic model, I consider what happens when there is no exogenous collateral constraint but the strategic interaction between the open economy and international lenders is modeled explicitly. Under somewhat stronger assumptions on productivity parameters, I show that the strategic interaction performs the same role as the exogenous collateral constraint in the basic model: It separates the determination of the external debt to capital ratio from the other decision problems that go into an optimal plan. Although there is no longer an exogenous collateral constraint to use for comparative statics, studying equilibria of the interaction between the open economy and international lenders leads to similar insights about risk-sharing and default. In particular, I identify two different types of equilibria. The first type features full risk-sharing and no default. The second type features no risk-sharing and randomization over default regimes. The equilibria are still identified by looking at the external debt to capital ratio and I provide intuitive conditions on the basic parameters of the model under which the risk-taking equilibrium is unique.

The basic insights of the model provide a new perspective on a number of empirical observations on emerging economies. I discuss these next, and then discuss other related literature. Section 2 presents the basic model with an exogenous collateral constraint and derives the threshold effect for risk-sharing and risk-taking behavior in terms of the debt to capital ratio. Section 3 looks at extensions of the basic model. I first introduce a risk-premium to compensate international investors for the probability of default and derive a similar threshold effect. I then look at the equilibrium between the open economy and international lenders when there is no exogenous collateral constraint. Section 4 concludes. Proofs are collected in a separate Appendix A.

### 2.1.1 Stylized Observations on Default and Risk-Sharing in Emerging Economies

The basic idea to relate international risk-sharing to default is motivated by a number of stylized observations on emerging economies. First of all, there are a number of recent empirical studies that document a surprising lack of consumption risk-sharing by emerging economies. For example, Kose et al. (2009) show that capital account liberalization has had insignificant or negative effects on consumption risk-sharing in emerging economies. This is in contrast to industrialized economies, where they find that consumption risk-sharing remains imperfect but has improved noticeably with financial market liberalization. Flood et al. (2009) and Yeyati and Williams (2011) use alternative measures of consumption risk-sharing but also find significant differences between industrialized and emerging economies in terms of the response of consumption risk-sharing to financial market integration. Sorensen et al. (2007) argue that improved consumption risk-sharing in industrialized countries is largely due to increased diversification of capital ownership. For example, in a study of European economies, Sorensen and Yosha (1998) show that membership of the EMU has significantly increased cross-border investments, and led to marked improvements in consumption risk-sharing across EMU member states. Asdrubali et al. (1996) find similar effects of interstate investment within the US. Obstfeld (1994a) also show that among the G-7 countries there has been a marked tendency for domestic consumption to become more closely correlated with world consumption over the period 1951 – 1988, and they attribute this decoupling of domestic consumption from domestic output volatility to increased cross-border diversification of capital.

The lack of consumption risk-sharing by emerging economies may therefore be due, in part, to a lack of cross-border investments. Yeyati and Williams (2011), in particular,

notes that "international portfolio diversification in the emerging world is still remarkably low, and have remained stable or declined" with financial globalization. However, the low average outward investments from emerging economies masks a bifurcation in trends over the past 10-15 years. While many emerging economies such as India, Romania and Turkey continue to hold negligible foreign assets (both FDI and equity) relative to GDP, others like Chile, Hungary and South Africa have recently started accumulating considerable foreign asset holdings. The differences do not seem to be explained entirely by differences in income or standard measures of capital market openness. For example, South Africa and Turkey have comparable degrees of capital market openness (see, e.g., Chinn and Ito, 2008). Both also have similar GDP/capita, which by World Bank estimates was $10,309/capita in Turkey in 2010 and $7,274/capita in South Africa. However, the stock of outward FDI and equity assets held by residents of South Africa was worth approximately 22.46% of GDP in 2010, while the outward stock of FDI and equity assets held by residents of Turkey was only 3% of GDP.[2].

Similar heterogeneity is observed in the incidence of default in emerging economies. Reinhart and Rogoff (2004) argue that while default events can be detached from fundamentals by well-known coordination problems (currency crisis, bank runs, sudden stops, etc.), the "serial default" observed in some emerging economies is much more systematic and appears to reflect the use of default as a conscience policy instrument. They argue that external debt over GDP (a common proxy for external debt over capital) is an important measure of default tendency, and also point out that "sovereign defaults tend to recur like clockwork in some countries, while being entirely absent in others" (Reinhart and Rogoff, 2004).

Furthermore, casual empirical observations are suggestive of an empirical correlation between the diversity in outward investment and default behavior. For the 36 largest

[2]Data is from UNCTADstat (2010)

emerging economies (according to IMF classifications), Figure 2.1 depicts a general downward trend in the average ratio of external debt to GDP (as a proxy for debt/capital) over the past two decades, and a corresponding upward trend in average total foreign asset holdings (FDI and equity) over GDP.[3] Many factors underlie these trends, but the model in this paper also provides a theoretical way to understand a direct link between them. External debt to GDP is a well-known measure of default risk (see. e.g., Reinhart and Rogoff, 2004), and the model in this paper illustrates how default risk can reduce international diversification incentives. A more refined picture is provided by Figure 2.2.1. Here I divide the emerging economies into two subgroups: One group (consisting of 12 economies) has a credit rating of at least investment grade on sovereign debt for the whole period 1990 to 2007; the other group (consisting of 11 economies) has a credit rating of at most speculative grade over the same time period.[4] The figure illustrates that the economies with a better credit ratings have accumulated substantially more foreign assets from 1990 onwards than the economies with a lower credit rating. As a group, outward investment from countries with speculative grade remains negligible, while foreign asset holdings of the countries with an investment grade are catching up quickly with industrialized countries. The trend is therefore towards further divergence. The apparent correlation between credit-risk and international diversification behavior illustrated in Figure 2.2 provides an empirical motivation to look at this relationship from a theoretical point of view.

[3]Data is from Lane and Milesi-Ferretti (2007).

[4]Credit ratings data is from the credit rating agency Standard and Poor's, and gives the credit rating agency's assessment of the creditworthiness of external, foreign currency denominated debt. Investment grade is assigned to countries for which the "capacity and willingness to meet financial commitments is strong"; while speculative grade refers to countries for which "adverse business, financial, or economic conditions will likely impair the obligor's capacity or willingness to meet its financial commitment on the obligation". 13 economies are omitted here because of lack of credit ratings data, or because credit ratings switched between investment and speculative grade over the sample period.

[5]Description of Figure 2.1 is provided in Appendix A, SectionA.3

[6]Description of Figure 2.2 is provided in Appendix A, Section A.3

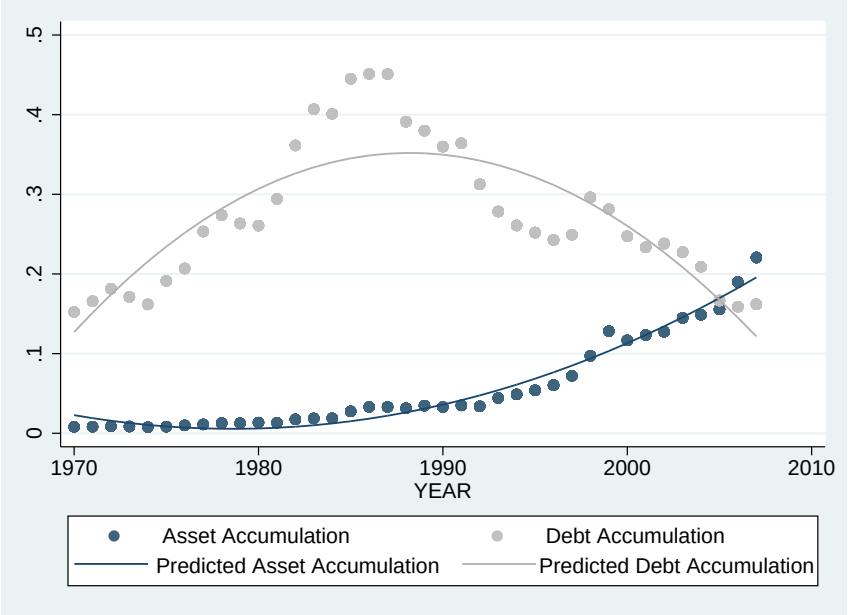
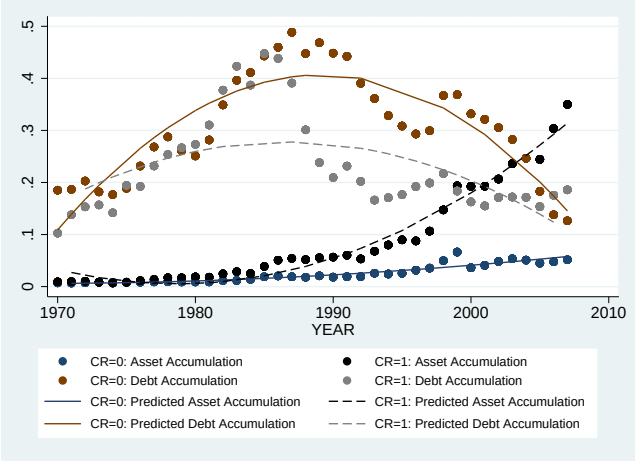


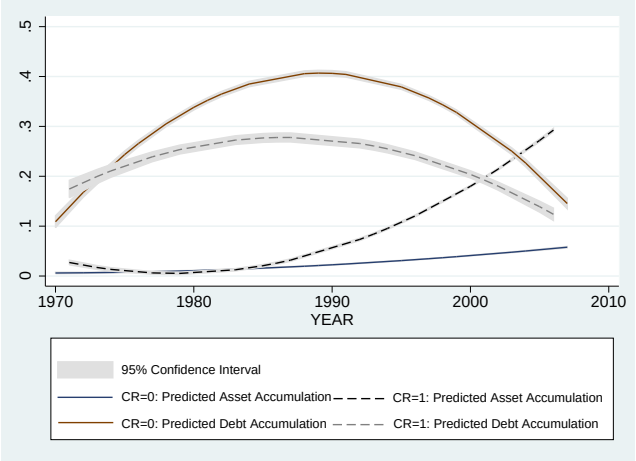

**Figure 2.1:** *Asset and Debt Stocks*[5]

### 2.1.2 Related Literature

The analysis in this paper is related to the large literature on home-bias in consumption and equities. The consumption home-bias refers to the empirical observation that equality of consumption growth rates – an implication of the basic common priors, Arrow-Debreu complete markets model – is dramatically rejected by the data (e.g., Backus et al., 1992). Equity home-bias refers to the empirical observation that the proportion of foreign assets held by domestic investors is too small relative to the predictions of standard portfolio theory (e.g., Levy and Sarnat, 1970; French and Poterba, 1991). Lack of consumption risk-sharing can be viewed as a reflection of a consumption home-bias, while lack of international capital diversification is related to (though distinct from) an equity-home bias. Sorensen et al. (2007) provide empirical evidence that both biases are closely linked, at least in industrialized countries. Lewis (1999) discusses both home-biases, the relationship between them, and various explanations proposed in the literature. Most theoretical explanations depend on market imperfections and/or the




2.2.1: Asset and Debt Stocks by Credit Rating




2.2.2: Asset and Debt Stocks with 95% Confidence Interval

**Figure 2.2:** *Asset and Debt Stocks* [6]

presence of non-tradable goods. To my knowledge, the general idea that a consumption home-bias can be related to domestic control over *ex-post* policy responses has not been explored in the literature.

The primary channel by which *ex-post* policy responses affect diversification incentives in this paper is through their option value. Of course, the principle that the option value of *ex-post* decisions can change the present value of an investment project is well-known from corporate finance (see, e.g., Majd and Pindyck, 1987). But showing that a similar option value from *ex-post* policy responses can reduce incentives for interna-

tional risk-sharing is a novel contribution of this paper. The connection seems most relevant for emerging economies because (1) emerging economies seem to have benefited less from consumption risk-sharing in the wake of financial globalization – in part because of the substantial home-bias in diversification of capital – and (2) economic policies in emerging economies have generally been more responsive to bad output shocks than in industrialized countries.[7] I focus specifically on default as the *ex-post* policy response because of the history of "serial default" in many emerging economies (Reinhart and Rogoff, 2004), and because of the correlation of default decisions and diversification home-bias discussed in the previous section.

The intuition behind the feedback from default decisions to risk-sharing behavior is also related to a recent literature on occupational choice and entrepreneurial risk-taking. In particular, Hopenhayn and Vereshchagina (2009) study a dynamic occupational choice model and show that discrete occupational choices can lead to risk-taking behavior by a risk-averse entrepreneur. In their setting, one can view entrepreneurial risk-taking as the reflection of the option value of future occupational choices. Formally, the discrete labor choice induces non-concavities in the continuation value function, and risk-taking smoothes over these non-concavities leading to utility gains. In a similar manner, the discrete choice over *ex-post* policy regimes in the current set-up induces non-concavities in the continuation value function in terms of the debt to capital ratio. Risk-taking represents a way to randomize over default regimes and thereby "fills-in" the non-concavity. The intuition and mechanism is therefore similar, although the application to an international finance setting does lead to substantive difference. In particular, in Hopenhayn and Vereshchagina (2009) entrepreneurs choose both the re-

[7]Recent examples of drastic policy responses to bad output shocks include the East Asian economies, where recession in 1997-1998 was accompanied by substantial debt restructuring and nationalization of financial institutions; Russia, where severe economic crisis in 1998 was followed by devaluation, default on domestic debts and a moratorium on payments to foreign creditors; and Argentina, where the recession of 1998-2000 was followed in 2001 by a default on external debts and severe capital controls.

turn in low and high payoff states, and the likelihood of a high payoff state (subject to a constraint on the mean return). This allows them to convexify the decision problem entirely. In the current set-up, the probability distribution on productivity shocks is exogenous and risk-sharing influences only the payoffs in different states. As a result, the continuation value function remains non-concave even when there is no risk-sharing at all. As a result, the method of analysis in this paper is, by necessity, quite different from the approach in Hopenhayn and Vereshchagina (2009).

## 2.2 Model

In this section, I present a two-period model of a small open economy with a single representative agent, and study efficient allocations as the solution to a planner's problem. The basic set-up of the model is simple in order to highlight the key interaction between consumption risk-sharing and the value of default options. I consider a number of extensions in Section 3.

*Technologies and Productivity Shocks:*

All technologies are linear.[8] In period 1 the country has a given capital stock $\bar{K} > 0$ which it can use to produce in a traditional sector with productivity $A > 0$. There is full capital depreciation.[9] The output of production can be used for consumption in period 1 (denoted $c_1$), or accumulated as capital for the period 2 production process (denoted $K_1$).

[8]The assumption of linear technologies implies that investments abroad are advantageous only for risk-sharing purposes. With decreasing returns to scale, international diversification could also be used to equate marginal rates of returns in countries with different capital stocks. This would complicate the analysis considerably and detract from the central argument.

[9]Full capital depreciation saves on notation. The results of the paper extend to any depreciation rate in $[0, 1]$, but including a depreciation rate adds to notation without any additional insights.

In period 1 the planner also chooses how much capital to invest at home and how much to invest abroad. Investment abroad is only valuable as a way to diversify risks from productivity shocks in period 2. I assume that in period 2 the country is able to produce in a modern sector. Output from the modern sector is used in trade and is more valuable than output from the traditional sector, but productivity in the modern sector is subject to a shock.[10] Specifically, there are two equally likely states of the world $s \in \{H, L\}$.[11] In state $H$ the country has productivity $\bar{a}$ in the modern sector, and in state $L$ the country has productivity $\underline{a}$ in the modern sector. I assume that productivity is higher in state $H$ than state $L$, and that the modern sector dominates the traditional sector so that $\bar{a} > \underline{a} > A$. Essentially, this assumption captures in reduced-form, a stylized feature of emerging economies. As trade barriers are reduced, emerging economies have been able to specialize production for foreign markets, leading to productivity gains but also greater volatility. Production gains are generally attributed to increased specialization, while greater volatility has been attributed to the effects of foreign preference and technology shocks on the domestic consumption value of output from exports.[12]

*International diversification:*

The potential for risk-sharing is modeled by allowing the country to invest a fraction

[10]The shock could be interpreted directly as a productivity shock, but could also be viewed as a shock to the domestic consumption value of domestic output coming from shocks to foreign demand for exports or exchange rate volatility.

[11]The important parts of the distributional assumption on shocks are symmetry and a compact support. The assumption that there are two equally likely states of the world is otherwise not critical to the analysis. It is possible, for example, to extend the model by allowing for a continuous and uniformly distributed shock, but at considerable cost in terms of notation and complexity of the solution. With a continuous distribution, threshold values appear as endogenous limits on an integral, and it is easier therefore to gain clear insights from the model with a discrete distribution. The symmetry assumption has substantive content as well. Shocks that are not symmetric around their mean imply that either the foreign or domestic economy is inherently more productive and would therefore induce an incentive for cross-border capital flows that is not related to risk-sharing.

[12]The advantage of specialization in sectors where a country has comparative advantages goes back to the classical Ricardo and Hecksher-Ohlin-Mundell trade models (see, e.g., Dornbusch et al., 1977). The trade-off between the productivity gains from specialization and the increased vulnerability to external shocks is established theoretically in Easterly et al. (2000), and verified empirically for emerging economies in Kose et al. (2005).

of its accumulated capital abroad, prior to the realization of productivity shock in the modern sector. Capital outflows are invested in a foreign, modern sector with perfectly negatively correlated productivity shocks. This means that the country can, in principle, fully diversify against the productivity shock $a_s \in \{\underline{a}, \bar{a}\}$ in the modern sector through international diversification of capital. Denote the fraction of capital invested at home by $\theta_1 \in [0, 1]$, and the fraction invested in the foreign sector by $(1 - \theta_1)$.[13]

Two implications of the assumptions on technologies at home and abroad are worth re-emphasizing:

1. Since production shocks in the modern sector at home and abroad are perfectly negatively correlated, the country can perfectly diversify production risks by choosing $\theta_1 = 1/2$. Hence, when the representative agent is risk-averse, there are maximal insurance gains from risk-sharing.
2. Since technologies have constant returns to scale in all sectors (home and abroad) and both states are equally likely, there are no benefits from investment in the foreign sector other than for risk-sharing purposes. A risk neutral agent would be indifferent between investments in either sector. Hence, the focus of the analysis is purely on foreign investments for the purpose of risk-sharing.

*Ex-post Capital Allocation:*

Unlike the *ex-ante* allocation decision between domestic and foreign capital investments ($\theta$), the allocation of capital between the domestic modern and domestic traditional sectors is made *ex-post* to the realization of shocks. Hence, only domestically held capital

[13] In reality, investments in the foreign sector might generally be accompanied by a counterflow of investments into the domestic, modern sector from abroad. It is notationally simpler and without loss of generality to suppress these counterflows since they do not have welfare implications for the domestic consumer. It is important only to highlight that foreign investment into the domestic economy are not subject to default or repossession, at least not to the advantage of the domestic consumers.

is allocated between the modern and traditional sectors in period 2. Denote the domestic capital allocated to the modern sector by $K_2^M = (K_2^{MH}, K_2^{ML})$ and the domestic capital allocated to the traditional sector by $K_2^T = (K_2^{TH}, K_2^{TL})$.[14]

*Borrowing:*

As well as the direct (or equity) investments abroad captured by $\theta$, the open economy is connected to international capital markets through access to international borrowing and lending. In particular, I assume that the domestic economy is small and can borrow or lend capital in international capital markets at a given rate of interest $r > 0$ in period 1. The borrowing (or lending) decision is denoted by $D_1$. Borrowing is subject to an exogenous collateral constraint that ensures that countries are able to repay debts in period 2:

$$D_1 \leq \bar{\omega} K_1 \,, \tag{2.1}$$

where $\bar{\omega}$ is the collateral constraint which is restricted to lie in the range $[0, \underline{a}/(1+r)]$. Note that the restriction on $\bar{\omega}$ implies that default – when it occurs – is always voluntary since net output (after paying debt obligations) in period 2 is always at least equal to

$$\underline{a} K_1 - (1+r)\bar{\omega} K_1 = K_1(\underline{a} - (1+r)\bar{\omega}) \;\geq\; 0 \Leftrightarrow\; \bar{\omega} \leq \underline{a}/(1+r)\,. \tag{2.2}$$

*Default Decisions:*

The novel feature of the model is to introduce the possibility of default in period 2 (after the realization of shocks). The default decision is denoted $\lambda_2 \in \{0,1\}^2$, where $\lambda_2^s = 1$ means that the country services its debts in state $s$, while $\lambda_2^s = 0$ means that it defaults. Hence, if the open economy has a debt stock of $D_1$ from period 1 and chooses $\lambda_2^s = 1$ it must repay $(1+r)D_1$ in state $s$. If the country chooses $\lambda_2^s = 0$ it defaults on $(1+r)D_1$ and

[14] $K_2^{MH}$ and $K_2^{ML}$ denote capital allocated domestically in the modern sector in state $H$ and state $L$, respectively. $K_2^{TH}$ and $K_2^{TL}$ denote capital allocated domestically in the traditional sector in state $H$ and state $L$, respectively.

faces default penalties. In much of the existing literature, exclusion from future borrowing is the primary default punishment (e.g., Aguiar and Gopinath, 2005; Bai and Zhang, 2012; Cuadra and Sapriza, 2006, 2008; Lizarazo, 2009; Yue, 2010). However, exclusion from future borrowing is not a suitable punishment in a two period model. Moreover, Bulow and Rogoff (1989) argue that exclusions from future borrowing is in general not sufficient to prevent default and therefore not sufficient to provide access to international capital for emerging economies. Empirical evidence also suggests that exclusion either does not occur or is only very short-term (see, e.g., Beers and Bhatia, 1999). Bulow and Rogoff (1989) suggest that other direct punishment mechanisms are required: "Our analysis establishes rather general conditions under which small countries *cannot* establish a reputation for repayment. If these conditions are met empirically, then loans to LDCs (less developed countries) are possible only if creditors have either political rights which enable them to threaten the debtor's interests outside its borrowing relationship, or legal rights. Legal rights might include the ability to impede a country's trade, or to seize it financial assets abroad." I capture both of the direct mechanisms suggested by Bulow and Rogoff (1989) by assuming that there are two punishments for default.

First of all, if the country defaults all capital invested abroad is repossessed (i.e., returns on that capital do not accrue to the defaulting country). This seizure of financial assets abroad represents a simple way for debtors to recover some of the value of loans that have been defaulted on. However, if the country does not invest much capital abroad, repossession of foreign assets is not a strong deterrent to default. I therefore also allow for a country that defaults on debts to be punished in terms of trade sanctions. Specifically, I assume that in period 2 the country retains the option to produce in the traditional sector. If the country defaults, trade sanctions are imposed and it is not able to participate in international trade, and therefore cannot produce in the modern sector. Hence, a defaulting country is forced to produce using the traditional sector. This im-

pediment to trade represents a default punishment because, by assumption, productivity in the modern sector dominates productivity in the traditional sector in both states of the world. It also captures, in a stylized way, the empirical observation that productivity – especially in exporting sectors – usually falls dramatically after defaults events.[15]

Hence, the borrower country faces the following trade-off: If it defaults it saves on the payment of debts and therefore retains a higher quantity of capital to use in domestic production. However, default also leads to repossession of foreign assets, and to trade restrictions which reduce the marginal return per unit of capital employed domestically.

*Timeline:*

Figure 2.3 gives a timeline summarizing the decision problem of the planner. Recall that in period 1 the planner makes a borrowing/lending decision ($D_1$), a capital accumulation decision ($K_1$), and an *ex-ante* capital allocation decision between the home and foreign sectors ($\theta_1$). In period 2 the planner then makes a decision regarding default ($\lambda_2$) and an *ex-post* capital allocation decision between the modern and traditional sectors ($K_2^M$ and $K_2^T$). The exogenous parameters of the model are the productivity parameters $A$, $\underline{a}$, $\bar{a}$, the interest rate $r$, the initial capital stock $\bar{K}$ and the collateral constraint $\bar{\omega}$.

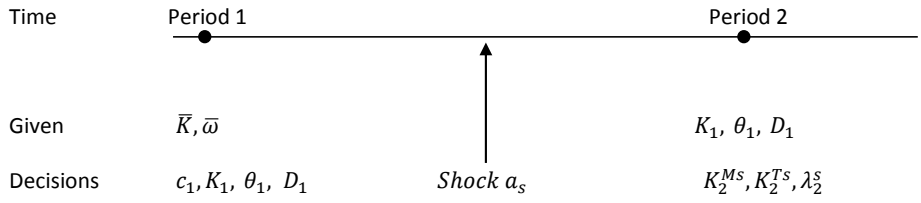



**Figure 2.3:** *Timeline Risk Sharing with Collateral Constraint and Default*

[15] Martinez and Sandleris (2011) presents empirical evidence that sovereign defaults are associated with a decline in trade and productivity.

### 2.2.1 Efficient Allocations

In order to define an efficient allocation, it is useful to present the decision problem of the planner recursively.

*Period 2 problem:*

In period 2 the planner makes decisions regarding the allocation of capital between modern and traditional sectors in each state of the world. The period 2 decision problem in each state $s \in \{H, L\}$ therefore depends on the borrowing/lending decision ($D_1$), the capital accumulation decision ($K_1$) and the capital allocation decision ($\theta_1$) from period 1. The period 2 decision problem is described by the following optimization problem:

$$
\begin{aligned}
v_2^s(K_1, \theta_1, D_1) &= \max_{\{(c_2^s, K_2^{Ts}, K_2^{Ms}) \geq 0, \lambda_2^s \in \{0,1\}\}} u(c_2^s) && (2.3)\\
\text{s.t.} \quad c_2^s &\leq \left[\lambda_2^s a_s K_2^{Ms} + A K_2^{Ts}\right] + \lambda_2^s (2\mu - a_s)(1-\theta_1)K_1 - \lambda_2^s (1+r) D_1 && (2.4)\\
K_2^{Ms} + K_2^{Ts} &\leq \theta_1 K_1 \,, && (2.5)
\end{aligned}
$$

where $\mu = \frac{1}{2}\bar{a} + \frac{1}{2}\underline{a}$ denotes the expected value of $a_2^s$ and $u : \mathbb{R}_+ \to \mathbb{R} \cup \{-\infty\}$ is the felicity function describing instantaneous utility. I assume throughout that $u$ is continuous on $\mathbb{R}_+$, twice continuously differentiable on $\mathbb{R}_{++}$, and that temporaneous marginal utility is of the form $u'(x) = x^{-\gamma}$ for some $\gamma > 0$.[16]

*Period 1 problem:*

Given the period 2 value functions $v_2^s$ for $s \in \{L, H\}$, the period 1 decision problem is described by the following value function which depends on period 1 capital stocks ($\bar{K}$) and the collateral constraint ($\bar{\omega}$):

[16] As is well known, the assumption on temporaneous marginal utilities implies that $u$ is of the form $u(x) = x^{1-\gamma}/(1-\gamma)$ when $\gamma \neq 1$ and $u(x) = \log x$ when $\gamma = 1$. The restriction $\gamma > 0$ implies that the representative agent is (strictly) risk-averse.

$$v_1(\bar{K}, \bar{\omega}) = \max_{\{(c_1,K_1)\geq 0, D_1, \theta_1 \in [0,1]\}} u(c_1) + \frac{\beta}{2}\left[v_2^H(K_1, \theta_1, D_1) + v_2^L(K_1, \theta_1, D_1)\right] \quad (2.6)$$

$$\text{s.t.} \quad c_1 \leq A\bar{K} + D_1 - K_1 \quad (2.7)$$

$$D_1 \leq \bar{\omega} K_1 \quad (2.8)$$

where $\beta \in (0, 1]$ is a discount factor and $v_2^s$ is the period 2 value function in state $s \in \{H, L\}$ (defined above).

*Efficient allocations:*

I look for efficient allocations as the solution to a planner's problem for the small open economy, introducing a simple tie-breaker rule in favor of non-default in order to simplify exposition.

**Definition 1 (Strongly Efficient Allocation)** *Given parameter values for ($\bar{K}$, $\bar{\omega}$, A, $\bar{a}$, $\underline{a}$, r, $\beta$), an allocation ($c_1$, $c_2$, $K_1$, $\theta_1$, $D_1$, $\lambda_2$, $K_2^M$, $K_2^T$) is feasible if ($c_1$, $c_2$, $K_1$, $K_2^M$, $K_2^T$) $\geq 0$, $\theta_1 \in [0, 1]$, $\lambda_2 \in \{0, 1\}^2$ and $D_1 \leq \bar{\omega} K_1$. The allocation is efficient if it is feasible and ($K_2^{Ms}$, $K_2^{Ts}$, $\lambda_2^s$) solves $v_2^s(K_1, D_1, \theta_1)$ for $s \in \{H, L\}$, and ($K_1$, $D_1$, $\theta_1$) solves $v_1(\bar{K}, \bar{\omega})$. The allocation is strongly efficient if it is efficient and in each state $s \in \{H, L\}$ either (1) $\lambda_2^s = 1$ or (2) $\lambda_2^s = 0$ and there does not exist another efficient allocation with $\lambda_2^s = 1$.*

The definitions of feasibility and efficiency are standard. The restriction to strongly efficient allocations involves a simple tie-breaker rule in favor of non-default when there are multiple efficient allocations. I focus on strongly efficient allocations only for greater expositional clarity, since non-uniqueness of efficient allocations arises only when there is indifference between different default regimes. This occurs on a measure zero set of parameters.

*Assumptions on productivity parameters:*

In general, no restrictions are imposed on lending and borrowing beyond the collateral constraint in equation (2.1). However, to capture the interaction between the *ex-ante* risk-sharing decision ($\theta$) and the *ex-post* default decision ($\lambda$), an additional assumption is required on the productivity parameters in the model to ensure that economy will be a borrower country.

**Assumption 1** *Denote the standard deviation of the random variable x by std*$(x)$*. The following relationships exist between the productivity parameters in the modern sector, traditional sector and the interest rate.*

*(A1.1)* $A < \underline{a} < \bar{a}$.

*(A1.2)* $\underline{a} < (1 + r) < \mu$.

*(A1.3)* $std\left(a_2^s\right) < A/2$.

The first inequality, (A1.1), states that the modern sector dominates the traditional sector. With a weak inequality this assumption is without loss of generality since the capital allocation decision between modern and foreign sectors is made *ex-post*, and if $A > \underline{a}$ the economy could simply utilize the traditional sector in state $L$ (in which case $A$ essentially replaces $\underline{a}$). The assumption of a strict inequality is only required to ensure uniqueness of results and is otherwise not essential. As such, the first inequality is an innocuous assumption.

The second inequality, (A1.2), states that the expected productivity of capital in the emerging economy is higher than the international cost of capital, which is in turn higher than the productivity in the low state of the world. The fact that there has traditionally been a considerably greater flow of capital into emerging economies as a group than out of emerging economies, suggests that the first part is empirically relevant. The second

also seems innocuous given the interpretation of the low state of the world. However, unlike (A1.1), the condition $(1 + r) < \mu$ is of considerable importance for the analysis. It implies that the collateral constraint on borrowing binds in period 1, which allows me to separate the debt to capital ratio from period 1 ($D_1/K_1$) from the diversification ($\theta_1$) and default ($\lambda_2$) decisions. I assume a strict inequality only for simplicity, and because empirical evidence overwhelmingly suggests that expected returns to capital in emerging economies do exceed the expected return in industrialized countries.

Finally, the last inequality, (A1.3), puts an upper bound on the variance of the technology shock relative to the productivity in the traditional sector. The recent economic history of emerging economies has numerous examples of external debt defaults (or substantial restructuring or renegotiation of debts) which, almost without exception, were precipitated by large negative output shocks. In the context of the model, $A$ should be interpreted as the productivity in the open economy following this type of default event. The inequality $std(a) = (\bar{a} - \underline{a})/2 < A/2$ puts a bound on how large the variation in productivity in the modern sector can be, relative to the output in a default event. For example, in the limiting case where $\underline{a} = A$, the bound states that the drop in output per unit of capital from best state to worst state, should not be greater than 50%. Note that this still represents an enourmous output shock and empirically such output shocks are anomolies.[17] In the main Proposition of this Section, the assumption will be needed to ensure that the threshold values identified for risk-sharing and risk-taking in terms of the debt to capital ratio lie in the range $[0, \underline{a}/(1 + r)]$.

[17]For example, during the massive downturn in Argentina around the end of 2001, output fell by 15 % in one year and by just over 20 % from its previous peak amidst sovereign default and devaluation. Even in Russia during the early 1990's, the cumulative fall in GDP is estimated to have been less than 40%.

### 2.2.2 Gains from risk-sharing without default options

To establish a benchmark for the potential gains from international risk-sharing, first suppose that there is no international sector ($\theta_1 = 1$) and no option to default ($\lambda_2 = (1, 1)$). The following Proposition illustrates that an efficient allocation exists in this case, that the country borrows on the international market (although the collateral constraint does not necessarily bind in this case), and that consumption and domestic production are volatile. To formalize volatility, note that *ex-ante* to the realization of period 2 productivity shocks, output and consumption in period 2 are random variables for any given allocation of $(K_1, D_1, \theta_1, K_2^M, K_2^T)$, since they depend on the realization of the productivity shock $a_2^s$. It therefore makes sense to consider both their variance (volatility) and their correlations (a common measure of consumption risk-sharing). The following proposition establishes that without risk-sharing opportunities, both domestic output and domestic consumption in Period 2 are higher in state $H$ than in state $L$.

**Proposition 1** *Under Assumption 1 and the constraints $\theta_1 = 1$ and $\lambda_2 = (1, 1)$, a unique efficient allocation exists. Moreover, for all values of $\bar{K} > 0$ and $\bar{\omega} \in [0, \underline{a}/(1 + r)]$, if $(c_1^*, c_2^*, K_2^{M*}, K_2^{T*}, K_1^*, D_1^*, \theta_1^* = 1)$ is efficient, then $K_1^* > 0$, $D_1^* > 0$, $K_2^{T*} = 0$, $y_2^H > y_2^L$ and output and consumption in period 2 are perfectly correlated.*

**Proof.** The only non-trivial part of the proof is to show that $D_1^* > 0$. The argument for this is analogous to the argument in the proof of Proposition 2. The remaining steps are standard and therefore omitted. ■

Proposition 1 illustrates that in the simplest benchmark case, output and consumption are volatile and perfectly correlated. A risk-averse representative agent would clearly prefer mean consumption to this volatile consumption. Diversification (through $\theta_1$) allows the country to achieve exactly this type of insurance against the productivity

shock, and therefore leads to consumption risk-sharing. The following proposition establishes that the country will make full use of international risk-sharing when there is no option to default ($\lambda_2 = (1, 1)$), and thereby demonstrates how international risk-sharing leads to strict welfare gains.

**Proposition 2** *Under Assumption 1 and the constraint $\lambda_2 = (1, 1)$, a unique efficient allocation exists. Moreover, for all values of $\bar{K} > 0$ and $\bar{\omega} \in [0, \underline{a}/(1 + r)]$, if ($c_1^*$, $K_1^*$, $D_1^*$, $\theta_1^*$, $c_2^*$, $K_2^{M*}$, $K_2^{T*}$, $\lambda_2^* = (1, 1)$) is efficient, then $D_1^* = \bar{\omega} K_1^*$, $K_2^{T*} = 0$, $\theta_1^* = (1/2)$, domestic output in state H is higher than in state L but $c_2^H = c_2^L$. Hence, at an efficient allocation, period 2 output and consumption are independent.*

**Proof.** The proof is given in the Appendix A. ■

Proposition 2 illustrates that when the country is able to share risks, it will fully diversify income and thereby fully insure against output shocks. To see that the country achieves full diversification, note that the Proposition establishes that the country produces only in the modern sector in period 2, and that in period 1 it allocates one half of its capital each to the home and foreign sectors. As a result, while domestic output remains volatile (subject to the shock in the modern sector), domestic consumption is constant. Since allowing $\theta_1$ to take values between $[0, 1]$ relaxes the constraints on an efficient allocation (relative to the constraints in Proposition 1), it is clear that welfare is improved through international risk-sharing. Moreover, the uniqueness of the efficient allocations establishes that the introduction of international risk-sharing opportunities leads to a strict *ex-ante* welfare gain.

In fact, a comparison of the outcomes in Proposition 1 and Proposition 2 illustrates two potential benefits of risk-sharing. First of all, without the possibility of international risk-sharing ($\theta_1 = 1$), Proposition 1 establishes that output and consumption in period 2

are perfectly correlated and both volatile, while with international risk-sharing Proposition 2 establishes that output is volatile and consumption is constant (hence independent of output). International risk-sharing therefore has insurance benefits because it decouples consumption from output. Since consumption is relevant for welfare, this leads to strict welfare gains. However, there is also a potential indirect benefit of international risk sharing. Under Assumption 1, a country with the constraint $\theta_1 = 1$ will not necessarily borrow up to the collateral constraint. The reason is that borrowing is risky when $r > \underline{a} - 1$, and a risk averse agent may therefore not always borrow as much as the collateral constraint allows. With international risk sharing, on the other hand, there is a risk-free return on capital $\mu - 1$ and under Assumption 1 the country will therefore exhaust the collateral constraint. By providing insurance, international risk-sharing therefore also potentially increases investment.

Finally, note that both the direct and indirect benefits from international risk-sharing are due solely to risk-aversion. If the representative agent is risk neutral (felicity function $u(x) = x$), there are no advantages of international risk-sharing at all. The constant returns to scale assumption in production ensures this, and therefore places the focus of the analysis purely on the risk-sharing benefits from international diversification of capital.

### 2.2.3 Trade-off between risk-sharing and default

I now allow for the country to make a discrete decision in period 2 about whether to service or default on its debt obligations. For now, I continue to assume that there is an exogenous collateral constraint on borrowing in period 1 and that the interest rate $r$ is given. These assumptions are relaxed in Section 3 of the paper. I also maintain

Assumption 1. Recall that the default decisions are denoted by $\lambda_2 = (\lambda_2^H, \lambda_2^L) \in \{0,1\}^2$, where $\lambda_2^s = 1$ means that the country services debts in state $s$ in period 2, and $\lambda_2^s = 0$ means that the country defaults in state $s$ in period 2.

The country now faces a trade-off. Risk-sharing reduces exposure to productivity shocks but increases the penalties of default (due to the potential repossession of foreign assets). The *intrinsic value* of default is determined by productivity in the traditional sector $A$ and the default saving $(1+r)D_1$. But as long as there is some exposure to the productivity shock, default also has an *option value*. In the high state of the world, the country can service debt payments and obtain a high marginal rate of return on capital $\bar{a}$. In the low state of the world, the country can default and obtain the default saving $(1+r)D_1$. The ability to make the default decision *ex-post* to the realization of the productivity shock therefore has an option value, but only if the country does not diversify away its exposure to the productivity shock. The trade-off determines the optimal choice of $\theta_1$ (the fraction of capital invested domestically). A country using *ex-ante* risk sharing reduces volatility of consumption relative to output, while a country using *ex-post* default decisions will experience higher consumption volatility but retains a more valuable default option. Efficient allocations are determined by the interaction between optimal *ex-ante* decisions (regarding capital accumulation and risk-sharing) and optimal *ex-post* decisions regarding default. The result is summarized in the following proposition.

**Proposition 3** *Under Assumption 1, a unique strongly efficient allocation exists for all* $(\bar{K}, \bar{\omega})$*. Moreover, there exist* $\omega_1, \omega_2 \in (0,1)$*, depending on* $(\bar{a}, \underline{a}, A, r, \gamma)$*, with* $0 < \omega_1 < \omega_2 < \underline{a}/(1+r)$*, such that for all values of* $\bar{K} > 0$ *if* $(c_1^*, c_2^*, K_2^{M*}, K_2^{T*}, K_1^*, D_1^*, \theta_1^*, \lambda_2^*)$ *is strongly efficient, then* $D_1^* = \bar{\omega} K_1^*$ *and the following hold:*

1. *If* $\bar{\omega} > \omega_2$ *then* $K_2^{M*} = (0,0)$*,* $K_2^{T*} = (K_1^*, K_1^*)$*,* $\theta_1^* = 1$*,* $\lambda_2^* = (0,0)$*,* $y_2^{H*} = y_2^{L*}$ *and* $c_2^{H*} = c_2^{L*}$*.*

2. *If* $\bar{\omega} \leq \omega_1$ *then* $K_2^{M*} = (1/2)(K_1^*, K_1^*)$, $K_2^{T*} = (0,0)$, $\theta_1^* = (1/2)$, $\lambda_2^* = (1,1)$, $y_2^{H*} > y_2^{L*}$ *and* $c_2^{H*} = c_2^{L*}$.

3. *If* $\bar{\omega} \in (\omega_1, \omega_2]$ *then* $K_2^{M*} = (K_1^*, 0)$, $K_2^{T*} = (0, K_1^*)$, $\theta_1^* = 1$, $\lambda_2^* = (1,0)$, $y_2^{H*} > y_2^{L*}$ *and* $c_2^{H*} > c_2^{L*}$.

**Proof.** The proof is given in the Appendix A. ■

Proposition 3 first establishes that an efficient allocation always exists, and that the collateral constraint binds. It also demonstrates that optimal plan has threshold effects in terms of the collateral constraint ($\bar{\omega}$). The thresholds depend only on the productivity parameters $(A, \bar{a}, \underline{a})$, the interest rate $r$, and the coefficient of relative risk-aversion $\gamma$.[18] The threshold effect divides the optimal plan into three regions.

(1) A country with a high collateral constraint invests only domestically, defaults on debts and produces using the traditional sector in period 2. This plan leads to low consumption volatility because output from the traditional sector is not volatile. The country defaults in both states when the collateral constraint is sufficiently high because the default saving $(1 + r)\bar{\omega}K_1$ is higher than the loss in marginal productivity of capital from default punishment even in the high state of the world. In corporate finance terminology, the default is "in-the-money" in both states. In this case, there is no benefit from risk-sharing since it exposes foreign assets to repossession, and domestic production must anyway use the traditional sector.

(2) A country with a low collateral constraint fully utilize international risk-sharing opportunities, service debts in both states and produces using the modern sector. The country therefore experiences high domestic output volatility, but interna-

[18] If the model is extended to allow for depreciation, the thresholds do not depend on the depreciation rate. It is therefore not particularly interesting to include an additional parameter for depreciation in the model.

tional risk-sharing is used to decouple consumption from the output volatility. Since the collateral constraint is low, the default saving $(1 + r)\bar{\omega}K_1$ is lower than the loss in the marginal return of capital ($\mu$) in both states of the world. Default is "out-of-the-money", and risk-sharing is therefore optimal.

(3) A country with an intermediate collateral constraint invests only domestically and switches between two regimes *ex-post*. In the high state of the world default is "out-of-the-money" and it produces in the modern sector and services debts. In the low output state default is "in-the-money" and it produces in the traditional sector and defaults on debts. It is therefore the *option* to default *ex-post* depending on the state that makes risk-*taking* optimal when there is an intermediate level of debt to capital.

The interesting region identified in Proposition 3 is $\bar{\omega} \in (\omega_1, \omega_2]$. For high levels of the debt to capital ratio, countries avoid risks by using the traditional sector which is not subject to shocks. For low levels of the debt to capital ratio, countries avoid risks through international risk-sharing arrangements that decouple consumption from productivity shocks. But for intermediate levels of the debt to capital ratio, it is optimal to take risk even though the representative agent is risk-averse and full diversification of production risks is possible in the dominant modern sector. Proposition 3 therefore illustrates that the default option can be sufficiently valuable to induce risk-taking. The advantage of taking risks is that the country retains a more valuable default option.

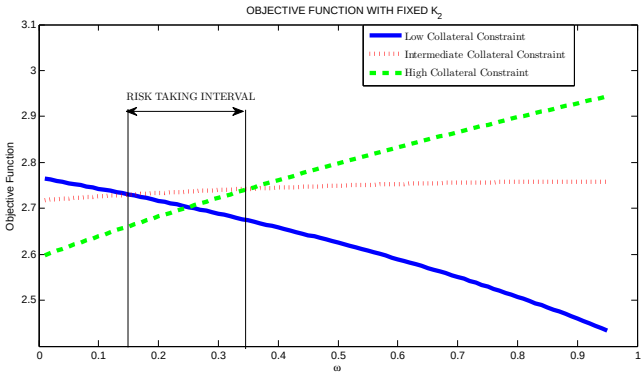
Formally, Proposition 3 can also be related to the structure of the dynamic problem facing the country. In particular, the discrete nature of the default option induces non-concavities in the agent's value of the period 2 problem. Limited risk-sharing can be welfare improving when it represents a randomization over the non-concavities over the period 2 value function. It is efficient for countries with intermediate levels of

debt/capital to make limited use of international capital ownership because the implicit risk-taking randomizes over the default and non-default regimes. This is illustrated in Figure 2.4, which shows how efficient allocations change for $\bar{\omega} \in [0, \underline{a}/(1+r)]$ when the coefficient of risk-aversion $\gamma = 0.1$. Figure 2.4.1 depicts the objective function for both periods with a fixed $K_1 > 0$ and different values of $\lambda_2$. For each $\lambda_2$, the figure also depicts the corresponding optimal value of $\theta_1$. The figure depicts the critical values, $\omega_1$ and $\omega_2$, at which an economy transitions between different risk sharing and default regimes. Figure 2.4.2 depicts the value function for different values of $\bar{\omega}$ ($\bar{K} > 0$ is fixed). The optimal capital accumulation decision in period 1 depends on the default decisions in period 2 and the value function is therefore defined piecewise for $\bar{\omega} \in [0, \omega_1]$, $\bar{\omega} \in (\omega_1, \omega_2]$ and $\bar{\omega} \in (\omega_2, \underline{a}/(1+r)]$. The actual period 1 value function is therefore the upper envelope of the three value functions depicted in Figure 2.4.2. The figure illustrates the sense in which default options provide a randomization over default and non-default regimes, and the values of $\bar{\omega}$ for which risk-taking is welfare improving.[19]

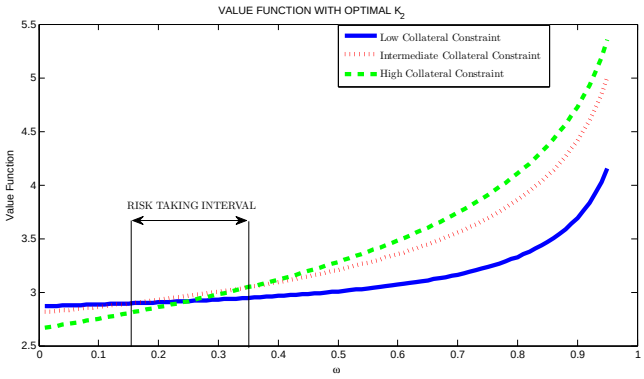
## 2.3 Risk-Sharing with a Risk Premium

The preceding model illustrates that countries may choose not to diversify against risks when they have a default option. The default option becomes valuable as the debt to capital ratio increases and therefore depends on the collateral constraint. However, the model implicitly assumes that the small open economy can borrow in period 1 at a fixed rate of interest $r$, up to an exogenously given collateral constraint $\bar{\omega}$, independently of its default behavior in period 2. The model thereby helps to provide intuition about the

[19]The value function for any given risk-sharing/risk-taking plan is generally convex in $\bar{\omega}$ (Figure 2.4.2). But the discrete default decision introduces a second source on non-concavity in the value function. This is apparent by looking at the objective function (Figure 2.4.1), which is concave within any given risk-sharing/risk-taking plan, but is not concave overall given the choice between plans because of the discrete default decision.




2.4.1: Objective function




2.4.2: Value function

**Figure 2.4:** *Objective and Value functions*

trade-off between *ex-ante* risk-sharing and the value of *ex-post* default options. But it is clear that if international lenders had rational expectations regarding the default decisions of the borrower country, they would accept default risk only if they are rewarded with an appropriate risk-premium.

In this section, I therefore augment the basic model to allow for a risk-premium to be paid to international investors in the presence of a default option. I study an alternative model in which the country borrows by selling bonds to international investors and impose a no arbitrage condition on the price of bonds to account for the possibility of default. I then look for an allocation, a bond price and a collateral constraint such that (1) the open economy makes optimal choices given the collateral constraint and bond

price, and (2) given the default decisions of the borrower country, international investors are indifferent between the purchase of bonds or the use of international capital markets at the given rate of interest $r$ (the no-arbitrage condition). In the second part of this Section, I then study a more complete model of the interaction between international lenders and the borrower country to illustrate how concerns over default can lead to an endogenous collateral constraint.

*Productivity assumptions:*

The basic assumptions on preferences and technologies are maintained throughout, but in order to simplify the analysis of the extensions in this Section, I make a stronger assumption on the relation between the return on capital in the modern and traditional sector, and the international cost of capital.

**Assumption 2** *Denote the standard deviation of the random variable $x$ by $std(x)$. The following relationships exist between the productivity parameters in the modern sector, traditional sector and the interest rate.*

*(A2.1)* $A < \underline{a} < \bar{a}$.

*(A2.2)* $2\underline{a} < 2(1 + r) < \bar{a}$.

*(A2.3)* $std(a_2^s) < A$.

Qualitatively, Assumption 2 is analogous to Assumption 1. In particular, it again imposes that the international cost of capital lies between the return on capital in the modern sector in the high and low states; that the expected return on capital in the modern sector exceeds the international cost of capital; and bounds the variance of the return on capital in the modern sector. As with Assumption 1, these qualitative features match stylized observations on emerging market economies well. However, quantitatively, Assumption 2 is stronger than its counterpart in Assumption 1.

In particular, the inequality $2(1 + r) < \bar{a}$ in (A2.2) is substantially stronger than the counterpart from Assumption 1 (A1.2). The condition that gross returns on capital in the high state are twice as high as the international cost of capital seems empirically implausible. However, it is important to note that the quantitative requirement comes from the assumption that the probability of a low state is 0.5 (and even then it is sufficient but not necessary to ensure that the country will borrow when it must pay a risk-premium for default). Since, in the analysis, the probability of a low state corresponds to the probability of default, the high requirement on the rate of return in the open economy relative to the world at large is dictated by the high probability of default. This high default probability is maintained for simplicity and greater clarity of the analysis, because it helps to remove investment incentives from the *ex-ante* capital allocation decision and thereby helps to focus the analysis on risk-sharing. The assumption is not essential to the intuition behind the trade-off between risk-sharing and default options in general. With the stronger condition (A2.2), the model in this section simply illustrates that if the return on capital is sufficiently high for emerging economies to borrow despite credit-risk premia, the trade-off between risk-sharing and default remains. Qualitatively, this does not require any change in the structure of the model, and the quantitative requirement (what constitutes a "sufficiently" high rate of return in the high state) is dictated here by other assumptions that simplify the analysis and interpretation but are not germane to the central argument. Since emerging markets have witnessed large inflows of debt over the past 20-30 years despite paying substantial credit-risk premiums, the key motivation for the assumption lies in its implications for borrowing behavior and these clearly find considerable empirical support. The inequality in (A2.3) is, however, weaker than the corresponding condition (A1.3) in Assumption 1, because the restriction on the variance of the shock is not as important under the stricter condition (A2.2).

It is straightforward to re-examine Proposition 3 under Assumption 2. The main

difference is that the threshold value $\omega_2$ would then lie outside the range $[0, \underline{a}/(1+r)]$, so that there are no longer any parameter values (consistent with the new Assumption 2 on parameters) for which a country will default in both states of the world. This is actually a more sensible implication. In a world where countries pay a risk-premium for the probability of default, it is clear that default in all states can never be optimal. If the country intended to default in all states, the risk-premium would be infinite and there would be no value to borrowing. In the extension of the model in this Section, that can lead to problems with existence and is therefore ruled out by Assumption 2. I studied the basic model in Section 2.2 under the (generally) weaker Assumption 1 only because allowing for default in all states is useful for the intuition about the option value of default, not because of the economic plausibility of such behavior. It is worth noting also that even with Assumption 2 it would still be the case that $\omega_1 < \underline{a}/(1+r)$, so an adapted version of Proposition 3 would still identify risk-taking behavior. It would just not be as clear where the incentive for risk-taking comes from once the possibility of default in all states has been obscured.

### 2.3.1 A model with bonds and a no-arbitrage condition

I now assume that the small open economy borrows in period 1 by issuing bonds. It sells the bonds to international investors at price $P$. To allow for simpler comparison to the previous model, each bond is a promise to repay $(1+r)$ units of consumption in period 2 (where $r$ is the risk-free rate of interest in the international capital market). The payoff from bonds is state contingent only insofar as it depends on the country's decision regarding default.

*Period 2 problem:*

The period 2 decision problem of the country is therefore unchanged, and is described by the following value function for each state $s \in \{H, L\}$.

$$\begin{aligned}
\bar{v_2^s}(K_1, \theta_1, D_1) &= \max_{\{(c_2^s, K_2^{Ts}, K_2^{Ms}) \geq 0, \lambda_2^s \in \{0,1\}\}} u(c_2^s) && (2.9)\\
\text{s.t.} \quad c_2^s &\leq \left[\lambda_2^s a_s K_2^{Ms} + A K_2^{Ts}\right] + \lambda_2^s (2\mu - a_s)(1-\theta_1) K_1 - \lambda_2^s (1+r) D_1 && (2.10)\\
K_2^{Ms} + K_2^{Ts} &\leq \theta_1 K_1 \,, && (2.11)
\end{aligned}$$

*Period 1 problem:*

It is the period 1 problem that changes for the open economy. Given an initial capital stock $\bar{K} > 0$, a bond price $P \geq 0$ and a collateral constraint $\bar{\omega} \in [0, \underline{a}/(1+r)]$ the planner now faces the following optimization problem in period 1.

$$\begin{aligned}
\bar{v_1}(\bar{K}, \bar{\omega}, P) &= \max_{\{(c_1, K_1) \geq 0, D_1, \theta_1 \in [0,1]\}} u(c_1) + \frac{\beta}{2}\left[\bar{v_2^H}(K_1, \theta_1, D_1) + \bar{v_2^L}(K_1, \theta_1, D_1)\right] && (2.12)\\
\text{s.t.} \quad c_1 &\leq A\bar{K} + PD_1 - K_1 && (2.13)\\
D_1 &\leq \bar{\omega} K_1 && (2.14)
\end{aligned}$$

*No-Arbitrage-Condition:*

I assume that the number of international investors is large relative to the the size of the open economy, and that international investors are well diversified so that they behave risk-neutral in their lending decisions. Lenders can either buy bonds from the open economy at a price $P$, or invest money in the international capital markets and obtain a risk-free rate of interest $r$. International lenders can condition their choices on the price of bonds issued by the small open economy, the initial capital stock $\bar{K}$, as well as the collateral constraint $\bar{\omega}$. Note that the collateral constraint and the initial capital stock

| Lender's Options | Invest | Return |
|---|---|---|
| Lend on the international market | $P$ | $P(1+r)$ |
| Lend to country that never defaults | $P$ | $(1+r)$ |
| Lend to country that defaults in one state only | $P$ | $\frac{1}{2}(1+r)+\frac{1}{2}0=\frac{1}{2}(1+r)$ |
| Lend to a country that always defaults | $P$ | 0 |

**Table 2.1:** *No Arbitrage Condition*

are both observable at the time the country issues bonds, so the basic assumption here is one of common knowledge regarding basic economic primitives. A *risk-adjusted equilibrium* is an allocation such that (1) the open economy acts optimally given its initial capital stock $\bar{K}$, the collateral constraint $\bar{\omega}$ and the bond price $P$, and (2) bond prices satisfy the following no-arbitrage condition given the default decisions of the open economy

$$P(1+r)=\frac{1}{2}(1+r)\lambda_2^H+\frac{1}{2}(1+r)\lambda_2^L \tag{2.15}$$

The no-arbitrage condition therefore determines an equilibrium price of bonds in the sense that (1) the borrower country acts optimally given the price, and (2) international investors are indifferent between the purchase of bonds (at the given price) and investments in the international capital market.

To motivate the no-arbitrage condition further, suppose that the price of a bond issued by the borrower country is $P$. An international investor then has two choices in period 1: (1) The investor can lend $P$ units of period 1 capital to the international market, for which (s)he will obtain a return of $P(1+r)$ in period 2. Alternatively, (2) the lender can buy 1 bond from the open economy and obtain a return of $(1+r)$ in each state in which the country services debts, and 0 in each state in which the borrower country defaults. Hence, the lender's returns depend on the borrower country's default decisions. The possible outcomes for a risk-neutral international lender are summarized as in the table 2.1.

Since the initial capital stock $\bar{K} > 0$ and the collateral constraint $\bar{\omega}$ are known, international investors can correctly predict the default behavior of the open economy. A risk-adjusted equilibrium therefore requires that for any collateral constraint and bond price $P$, the optimal default decision of the open economy equates the return identified in the corresponding row from Table (2.1) with the risk-free return in international markets $P(1 + r)$. So, for example, if the collateral constraint and bond price leads the country to assume a level of debt to capital at which it will default in neither state, then in a risk-adjusted equilibrium it must be that the price of the bond solves

$$P(1 + r) = (1 + r) \tag{2.16}$$

$$\Rightarrow \quad P = 1 . \tag{2.17}$$

If the collateral constraint and price of the bond lead the country to default in exactly one state of the world, then in a risk-adjusted equilibrium it must be that the bond price solves

$$P(1 + r) = \frac{1}{2}(1 + r) \tag{2.18}$$

$$\Rightarrow \quad P = \frac{1}{2} \tag{2.19}$$

Finally, it is clear that there can be no risk-adjusted equilibrium in which the country defaults on bonds that have a strictly positive value in both states of the world (since if the country defaults in both states of the world, the no-arbitrage condition implies that price of bonds will be zero). Hence, with a large number of investors, the no arbitrage condition is required to ensure that supply for bonds equals the demand for bonds. If investors preferred bonds to investments in the capital market, demand would be infinite and therefore exceed supply. If investors preferred investments in the capital market to the purchase of bonds, demand would be zero and any positive bond issue would lead to excess supply. Although, I do not model the dynamics of price adjustment implicitly, the no arbitrage condition should therefore simply be interpreted as a market clearing

condition that determines the bond price given rational expectations about default behavior.

*Timeline:*

A timeline summarizing the order in which decisions are made is given in Figure 2.5.

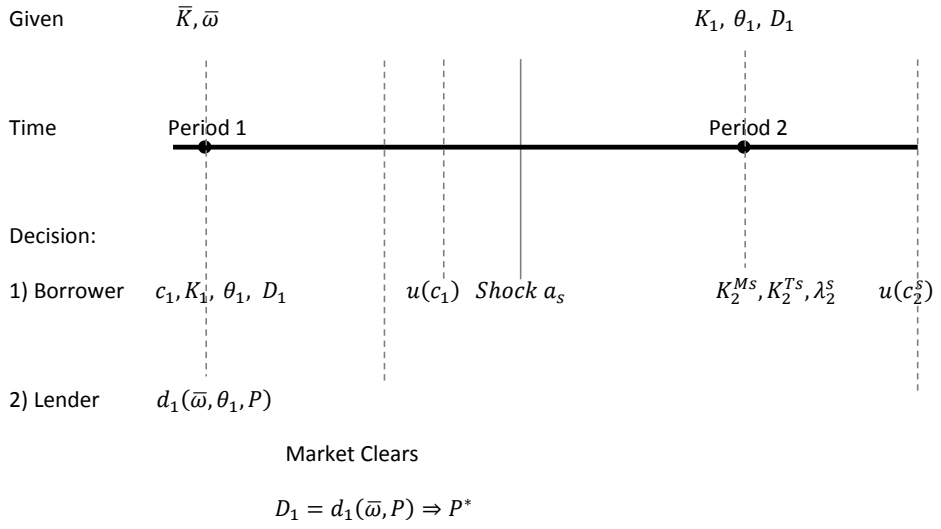



**Figure 2.5:** *Timeline Risk Adjusted Equilibrium*

## Risk-adjusted equilibrium

The following definition formalizes the preceding discussion of a risk-adjusted equilibrium.

**Definition 2 (Risk-adjusted equilibrium)** *For a given set of parameters* $(\bar{a}, \underline{a}, A, r, \beta, \bar{K})$*, a collateral constraint* $\bar{\omega} \in [0, \underline{a}/(1+r)]$*, an allocation* $(K_1, D_1, \theta_1, \lambda_2, K_2^M, K_2^T)$*, and a bond price P constitute a Risk-adjusted equilibrium (RAE) relative to* $\bar{K} > 0$ *if*

1. $(\lambda_2^s,\ K_2^{Ms},\ K_2^{Ts})$ *solves* $\bar{v}_2^s(K_1, D_1, \theta_1)$ *for* $s \in \{H, L\}$.

2. *For both* $s \in \{H, L\}$ *either (1)* $\lambda_2^s = 1$ *or (2)* $\lambda_2^s = 0$ *and there does not exist* $(\hat{\lambda}_2^s, \hat{K}_2^{Ms}, \hat{K}_2^{Ts})$ *that solves* $\bar{v}_2^s(K_1, D_1, \theta_1)$ *with* $\lambda_2^s = 1$.

3. *(*$K_1$*,* $D_1$*,* $\theta_1$*) solves* $\bar{v}_1(\bar{K}, \bar{\omega}, P)$.

4. *The following no-arbitrage condition is satisfied:*

$$P(1 + r) = \frac{1}{2}(1 + r)\lambda_2^H + \frac{1}{2}(1 + r)\lambda_2^L \tag{2.20}$$

The second part of the above definition formalizes the same tie-breaker rule used in the definition of a strongly efficient allocation in the previous Section. The tie-breaker rule is included to allow for a simpler statement of results because non-uniqueness occurs only for the (measure zero) set of primitives at which there is an indifference between two different default regimes. The tie-breaker rule favors non-default in such cases.

**Risk-Sharing Behavior in a Risk-Adjusted Equilibrium**

The following proposition provides sufficient conditions for the existence of RAE with risk-sharing and risk-taking behavior by the open economy.

**Proposition 4** *Suppose that Assumption 2 is satisfied. Let* $\omega_1$ *be the cut-off value from proposition 3.*[20] *Then* $\omega_1 \in (0, \frac{a}{1+r})$ *and the following hold:*

1. *For any* $\bar{K} > 0$ *and any* $\bar{\omega} \in [0, \omega_1]$ *there exists a unique risk-adjusted equilibrium with an allocation* $K_1^* > 0$, $D_1^* = \bar{\omega}\bar{K_1}^*$, $\theta_1^* = 1/2$, $\lambda_2^* = (1, 1)$, $K_2^{M*} = ((1/2)K_1^*, (1/2)K_1^*)$, $K_2^{T*} = (0, 0)$ *and a price* $P = 1$. *Call these Type I equilibria.*

[20] Recall that $\omega_1$ depends on $(\bar{a}, \underline{a}, A, r, \gamma)$

2. *For any* $\bar{K} > 0$ *and any* $\bar{\omega} \in (\omega_1, \frac{a}{1+r}]$ *there exists a unique risk adjusted equilibrium with an allocation* $K_1^* > 0$, $D_1^* = \bar{\omega} K_1^*$, $\theta_1^* = 1$, $\lambda_2^* = (1, 0)$, $K_2^{M*} = (K_1^*, 0)$, $K_2^{T*} = (0, K_1^*)$ *and a price* $P = 1/2$. *Call these Type II equilibria.*

**Proof.** The proof is given in the Appendix A. ■

The Type I equilibrium identified in Proposition 4 involves full risk-sharing, limited borrowing and no default. However, Proposition 4 also demonstrates that when the collateral constraint is weaker, there exists a different RAE in which the country borrows more (relative to its period 2 capital stock), services debts in the high state of the world and defaults in the low state of the world. Moreover, the open economy does not participate in risk-sharing. Hence, there is a trade-off between risk-sharing through diversification of capital ownership (which dominates in a Type I equilibrium) and the default option (which dominates in a Type II equilibrium). The optimal decision is determined by the exogenous collateral constraint.

The welfare comparison between Type I and Type II equilibrium is subtle. It is possible that the representative agent in the small open economy would strictly prefer the equilibrium of Type I (with risk-sharing) over the equilibrium of Type II (with default). However, from an international capital allocation perspective, the equilibrium of Type II (with risk-taking and default) is more efficient. This follows because, under Assumption 2, capital invested in the modern sector of the open economy is (in expectation) more productive than the alternative uses to which international capital can be put. The equilibrium with default involves a greater allocation of capital to the open economy, and it is therefore inefficient to restrict the allocation of capital to the borrowing country. Restrictions on lending are necessary only because the country may decide to default on debt obligations otherwise. The existence of different types of RAE, therefore identifies the potential for a trade-off between the welfare of the open economy and the efficient

allocation of international capital. Under the right assumptions on parameter values, the representative agent in the open economy would prefer the equilibrium with greater risk-sharing, while from an international capital allocation perspective the equilibrium with risk-taking is desirable because it allocates more capital to the country where it will be used most productively. This trade-off comes primarily from the assumption that the representative agent is risk-averse, while international investors are risk-neutral.

On the other hand, there also exist parameter values under which the open economy *strictly* prefers the equilibrium in which it pays a premium to borrow capital from international investors, does not share risks, exercises its default option in the bad state of the world and therefore faces volatile consumption (from an *ex-ante* perspective). Since the risk-sharing regime in a Type I equilibrium involves a stronger collateral constraint, Type II equilibrium implies higher welfare when higher borrowing and a greater value of default dominates the advantages of paying a lower premium for credit and sharing risk through international diversification. The following Section exploits the tension between welfare in Type I and Type II equilibria to study a model of risk-sharing and default without an exogenous collateral constraint. In doing so, I also provide sufficient conditions under which Type II equilibrium implies higher welfare for the borrower country than Type I equilibrium.

### 2.3.2 A model with endogenous collateral constraints

In a Risk-Adjusted Equilibrium (RAE) the initial capital stock ($\bar{K}$) and the collateral constraint ($\bar{\omega}$) are given, and are known by both the planner in the open economy and international investors. Given knowledge of $\bar{K}$ and $\bar{\omega}$, each can then correctly predict the behavior of the other and plan the optimal sale/purchase of bonds conditional on any

price $P$. A RAE price $P$ simply equates the supply and demand for bonds. However, the model does not address where the collateral constraint $\bar{\omega}$ comes from. In this Section, I look at an alternative model of the interaction between lenders and borrowers in which the collateral constraint emerges endogenously. I assume that the open economy first makes its capital accumulation and borrowing decisions, and international investors then choose at which price they are willing to purchase the bonds. There is no exogenous collateral constraint but international investors can condition their investment decisions on the observed capital and borrowing decisions of the open economy. As a result, the interaction has an explicit dynamic structure in which the open economy has a first mover advantage.[21]

I model the interaction between the open economy and international investors as follows. There is a large (infinite) number of international investors who are risk neutral in their lending behavior. They can invest or borrow unconstrained on an international capital market at a fixed risk-free rate of interest $r$. A bond issued by the open economy is a promise to repay $(1 + r)$ units of capital in period 2 (after the productivity shock is realized). Bonds are state-contingent only insofar as they depend on the default decision of the country in period 2. For simplicity, I assume again that the open economy can either service debt obligations or default on the whole debt and suffer the same default penalties as in the benchmark model (exclusion from trade in the modern sector and repossession of foreign assets).

*Timing:*

At the time when international investors make their investment decisions, the capital accumulation ($K_1$), capital allocation ($\theta_1$) and borrowing ($D_1$) decisions of the open economy are known. For any bond price $P$, I therefore denote the aggregate demand for

[21] In contrast, the interaction between the open economy and international lenders in a RAE is simultaneous and based on common knowledge of the primitives (i.e., the collateral constraint and initial capital stock).

bonds by international investors by $d_1(K_1, \theta_1, D_1, P) \mapsto \mathbb{R}_+ \cup \{\infty\}$. Given the fixed supply of bonds $D_1$, the capital accumulation and allocation decisions $(K_1, \theta_1)$, and the demand for bonds $d_1(K_1, \theta_1, D_1, P)$ by international investors, the price of bonds is determined to equate supply and demand. After the price of bonds is determined, period 1 consumption and utility in the open economy are realized. Period 2 then starts with the realization of the productivity shock in the modern sector and the open economy makes its period 2 capital allocation ($K_2^M$ and $K_2^T$) and default ($\lambda_2$) decisions. The following timeline summarizes the order in which decisions are made.

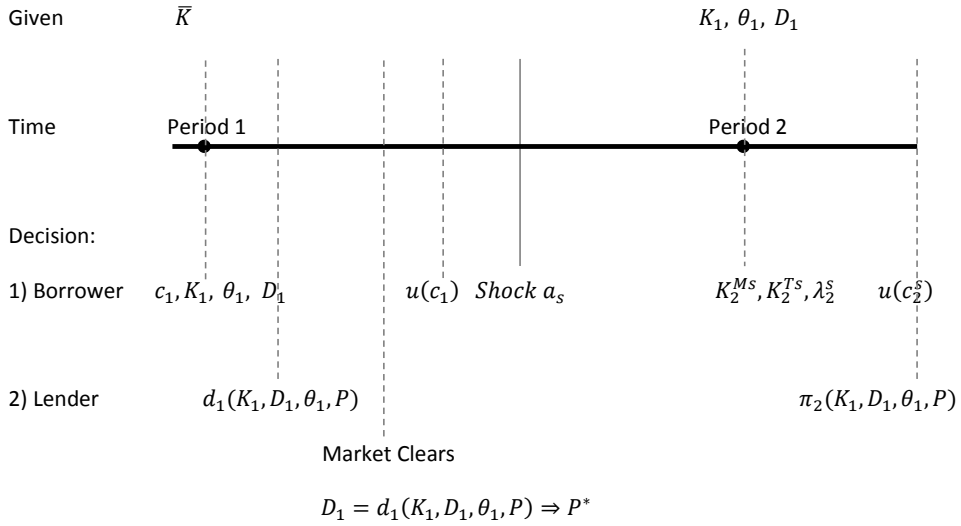



**Figure 2.6:** *Timeline Risk Adjusted with Endogenous Collateral constraint*

1. The open economy makes capital accumulation $(K_1)$ and capital allocation $(\theta_1)$ decisions, and decides how many bonds to issue $(D_1)$.
2. The price of bonds $P$ is determined to equate the fixed supply $(D_1)$ with the demand for bonds by international investors $(d_1)$.
3. Period 1 consumption occurs and period 1 utility is realized.
4. The period 2 productivity shock is realized.

5. Period 2 capital allocation ($K_2^M$ and $K_2^T$) and default ($\lambda_2$) decisions are made by the open economy.

6. Period 2 utility and payoff function are realized.

*Strategies:*

Given the interaction between the open economy and international investors describe above, we can define strategies for all parties. For any initial capital stock $\bar{K} > 0$, a strategy for the open economy is a choice of $(c_1, K_1, \theta_1, D_1)$ in period 1 and a choice of $K_2^M(K_1, \theta_1, D_1) \mapsto \mathbb{R}_+^2$, $K_2^T(K_1, \theta_1, D_1) \mapsto \mathbb{R}_+^2$, $\lambda_2(K_1, \theta_1, D_1) \mapsto \{0, 1\}^2$, and $c_2(K_1, \theta_1, D_1) \mapsto \mathbb{R}_+^2$ in period 2. The strategy of international investors is described by the aggregate demand for bonds conditional on any capital and borrowing decisions by the open economy in period 1 and any price for bonds $P$, $d_1(K_1, \theta_1, D_1, P) \mapsto \mathbb{R}_+ \cup \{\infty\}$.

*Period 2 problem:*

Given this definition of strategies, the constraints on strategy choices and payoffs can be defined. The payoff in period 2 for the open economy are defined by the following (usual) value function:

$$\tilde{v_2^s}(K_1, \theta_1, D_1) = \max_{\{(c_2^s, K_2^{Ts}, K_2^{Ms}) \geq 0, \lambda_2^s \in \{0,1\}\}} u(c_2^s) \tag{2.21}$$

$$\text{s.t.} \quad c_2^s \leq \left[\lambda_2^s a_s K_2^{Ms} + A K_2^{Ts}\right] + \lambda_2^s (2\mu - a_s)(1 - \theta_1) K_1 - \lambda_2^s (1 + r) D_1 \tag{2.22}$$

$$K_2^{Ms} + K_2^{Ts} \leq \theta_1 K_1 \,, \tag{2.23}$$

*Demand for bonds:*

For a bond price $P$, define the payoff function for international investors, denoted by $\pi_1$, as the net-payoff from purchasing bonds vs. investing in the international capital market at the risk-free rate of interest $r$. Given any aggregate demand function for bonds, $d_1$, the payoff for international investors therefore depends on the realized price of bonds,

$P$, as well as on the default decisions of the open economy. In turn, the default decisions of the open economy depend on the capital and borrowing decisions in period 1. Hence, the payoff function for international investors is the following.

$$\begin{aligned}\pi_1(K_1, D_1, \theta_1, P) &= \tilde{\pi}_1(d_1(K_1, D_1, \theta_1, P), \lambda_2(K_1, D_1, \theta_1)) && (2.24)\\ &= d_1(K_1, D_1, \theta_1, P)\Big[\left(\frac{1}{2}\lambda_2^H(K_1, D_1, \theta_1)(1+r) + \frac{1}{2}\lambda_2^H(K_1, D_1, \theta_1)(1+r)\right) \\ &\quad -P(1+r)\Big] && (2.25)\end{aligned}$$

*Price of bonds:*

Given an aggregate demand for bonds $d_1(K_1, \theta_1, D_1, P)$ and a supply of bonds, the price of bonds is determined in order to equate supply and demand:[22]

$$d_1(K_1, \theta_1, D_1, P) = D_1 \tag{2.26}$$

For any given $(K_1, \theta_1, D_1)$, define $P(K_1, D_1, \theta_1)$ as the price that solves Equation 2.26. Given an aggregate demand function $d_1$, I call $P(K_1, D_1, \theta_1)$ a bond pricing function. Then the period 1 payoff of the open economy depends on the initial capital stock ($\bar{K}$) and the bond pricing function $P(K_1, D_1, \theta_1)$.

*Period 1 problem:*

The period 1 payoff is described by the following value function:

$$\begin{aligned}\tilde{v_1}(\bar{K}) &= \max_{\{(c_1,K_1)\geq 0, D_1, \theta_1 \in [0,1]\}} u(c_1) + \frac{\beta}{2}\left[\tilde{v_2^H}(K_1, \theta_1, D_1) + \tilde{v_2^L}(K_1, \theta_1, D_1)\right] && (2.27)\\ \text{s.t.} \quad c_1 &\leq A\bar{K} + P(K_1, \theta_1, D_1)D_1 - K_1 && (2.28)\end{aligned}$$

[22] As before, I do not explicitly model the dynamic process by which prices equating supply and demand are determined. However, the relation to a subgame perfect equilibrium is clear. Assume that the pricing function $P$ represents the strategy of an auctioneer whose payoff is 1 if supply equals demand (Equation 2.26 is satisfied), and 0 otherwise. Then an Endogenous Collateral Equilibrium (Definition 3) is a subgame perfect equilibrium of the extensive form game between the open economy, an infinite number of international investors and the auctioneer. In the extensive form game, the open economy first chooses $(c_1, K_1, \theta_1, D_1)$, international investors then demand bonds $d_1(K_1, \theta_1, D_1, P)$, the auctioneer sets the price $P(K_1, \theta_1, D_1)$ and the open economy then chooses $(c_2(K_1, \theta_1, D_1), K_2^M(K_1, \theta_1, D_1), K_2^T(K_1, \theta_1, D_1), \lambda_2(K_1, \theta_1, D_1))$.

**Endogenous Collateral Equilibrium**

We can now define an Endogenous Collateral Equilibrium (ECE) as a strategy profile in which each agent acts optimally at each stage, given best responses of other agents in latter stages and a pricing function, and the pricing functions ensures that price for bonds always clears the market for bonds. An ECE also features the same tie-breaker rule in favor of non-default introduced in the definition of a strongly efficient allocation and a RAE, with the same motivation. Formally:

**Definition 3 (Endogenous Collateral Equilibrium)** *Given an initial capital stock* $\bar{K} > 0$*, an endogenous collateral equilibrium (ECE) is a strategy of the open economy in period 1,* $(c_1, K_1, D_1, \theta_1)$*, strategy of the open economy in period 2,* $(c_2, K_2^M, K_2^T, \lambda_2)$*, an aggregate demand function,* $d_1$*, and a bond pricing function P, such that*

1. *The period 2 strategy* $(c_2, K_2^M, K_2^T, \lambda_2)$ *solves* $\tilde{v_2^s}(K_1, \theta_1, D_1)$ *for all* $(K_1, \theta_1, D_1) \in \mathbb{R}_+ \times [0,1] \times \mathbb{R}$ *and for* $s \in \{H, L\}$.
2. *In the period 2 strategy for both states* $s \in \{H, L\}$ *either (1)* $\lambda_2^s = 1$*, or (2)* $\lambda_2^s = 0$ *and there does not exist an alternative strategy that solves* $\tilde{v_2^s}(K_1, \theta_1, D_1)$ *but has* $\lambda_2^s = 1$.
3. *The aggregate demand correspondence* $d_1$ *maximizes* $\pi_1(K_1, \theta_1, D_1, P)$ *for all* $(K_1, \theta_1, D_1, P) \in \mathbb{R}_+ \times [0,1] \times \mathbb{R} \times \mathbb{R}_+$.
4. *The bond pricing function P solves Equation (2.26) for all* $(K_1, \theta_1, D_1) \in \mathbb{R}_+ \times [0,1] \times \mathbb{R}$.
5. *The period 1 strategy* $(c_1, K_1, \theta_1, D_1)$ *solves* $\tilde{v_1}(\bar{K})$.

**Risk-sharing behavior in an Endogenous Collateral Equilibrium**

The following proposition first establishes existence of an ECE and gives general conditions under which the open economy will take risks in an ECE. These depend on a complex interaction between the parameters of the model, as well as the risk-aversion of the representative consumer (embodied in the general felicity function $u$.).

**Proposition 5** *Suppose that Assumption 2 is satisfied and let $\omega_1$ and $\omega_2$ be the cut-off values identified in Proposition 3. Then:*

1. *An ECE exists for all $\bar{K} > 0$.*
2. *In an ECE $\theta_1 = 1$ for some $\bar{K} > 0$ if and only if the welfare of the representative consumer in a Type II equilibrium for $\bar{\omega} = \omega_2$ in Proposition 4 is greater than the welfare of the representative consumer in a Type I equilibrium for $\bar{\omega} = \omega_1$ in Proposition 4 (i.e. $\bar{v}(\bar{K}, \omega_2, 1/2) > \bar{v}(\bar{K}, \omega_1, 1)$). Otherwise $\theta_1 = 1/2$.*

**Proof.** The proof is given in the Appendix A. ■

The condition describing risk-taking in an ECE has an intuitive connection to the results in Proposition 4. In an ECE, the open economy has a first-mover advantage. International investors correctly predict default behavior given any choice of $K_1$ and $D_1$, and the price of bonds therefore adjusts endogenously to the country's capital and borrowing decisions. However, it is *as if* the borrower country can essentially choose its desired collateral constraint in a risk-adjusted equilibrium, and the bond price adjusts accordingly. This ability to set the collateral constraint comes from the first-mover advantage. The country will choose to take risks if the largest collateral constraint it can choose given a bond price of $1/2$ makes it better off than the largest collateral constraint

it can choose given a bond price of 1. This is exactly the welfare comparison between Type I and Type II risk-adjusted equilibrium indicated in the Proposition.

The trade-off between risk-sharing and the value of a default option was also a feature of the model in Section 2.2, but there is a subtle change in emphasis identified in Proposition 5. In the model without risk-premia, the value of the default option is determined by the exogenous collateral constraint. Under a restrictive collateral constraint, default is not optimal in either state of the world, so the default option is never exercised and risk-sharing is optimal. However, if the country is able to borrow more relative to its stock of period 2 capital, the default option becomes more valuable and, as a result, risk-sharing becomes less valuable because it reduces randomization and exposes assets to repossession in the event of default. Although the *ex-post* default and *ex-ante* risk-sharing decisions are interrelated, the emphasis of the causality is determined by the backward induction nature of the optimization problem: The value of default (determined exogenously through the collateral constraint) determines the value of risk-sharing. However, in a model without an exogenous collateral constraint, there is a more subtle equilibrium relation between the *ex-ante* and *ex-post* decision problems. Suppose that a country fully shares risks so that productivity is no longer state-contingent. Then default is either optimal in both states of the world, or suboptimal in both states of the world. If the former, then international lenders will charge an infinite risk-premium and borrowing becomes impossible; hence the default option looses all value. If the latter, the default option is never exercised and therefore clearly has no value. Hence, the equilibrium condition of the interaction with international lenders introduces an indirect channel by which the risk-sharing decision of the borrower country effects the value of the default option. This subtle change in emphasis is captured in the endogenous collateral constraint that emerges in an ECE.

It remains to show that reasonable conditions on the parameters of the model are sufficient to ensure that an ECE will feature risk taking behavior by the open economy. I do this by fixing the risk-aversion of the representative consumer in the open economy by assuming log-utility preferences, and then give sufficient conditions for risk-taking in an ECE.[23]

**Proposition 6** *Suppose preferences are of the log-utility form (felicity function* $u(x) = \log(x)$ *for all* $x > 0$*). Suppose also that Assumption 2 is satisfied. Then an ECE exists for all* $\bar{K} > 0$*. Moreover, if* $|\underline{a} - A|$ *is sufficiently small,* $\theta_1 = 1$ *in the ECE (and the open economy therefore does not participate in risk-sharing).*

**Proof.** The proof is given in the Appendix A. ■

Proposition 6 provides sufficient conditions for risk-taking behavior by the open economy in an ECE. The value of risk-sharing is not directly related to $A$ because a country that shares risks never uses the traditional sector. However, the value of the default option is directly related to $A$, because if the default option is ever exercised, the traditional sector must be used due to the trade sanction default penalty. Proposition 6 therefore confirms that if the loss from using the traditional sector is not too great (relative to the use of the modern sector in the low state of the world), then the value of the default option exceeds the value of risk-sharing even when this directly affects the price that can be obtained for bonds.

Figure 2.7 is useful for illustrating the content of Proposition 6, and its relation to previous results. Each panel in the figure depicts the period 1 value function $v_1$ from Section 2.2 ($\bar{K}$ constant and $\bar{\omega}$ varying on the horizontal axis), with the following substantive changes. Parameters $(\bar{a}, \underline{a}, A, r)$ satisfy Assumption 2 (a stricter condition than

[23]Note that log-utility is a special case of the CRRA preferences used in the preceding analysis.

Assumption 1), and the representative agent has log-utility ($u(x) = \log(x)$). The threshold values $\omega_1$ and $\omega_2$ are calculated as in Proposition 3.[24] The collateral constraint always binds, and the appropriate optimal choice of $K_1$ is used in each part of the graph. Moreover,

- For $\bar{\omega} \leq \omega_1$, full risk-sharing ($\theta_1 = 1/2$) is optimal, along with full service of debts in period 2. The price of borrowing remains constant at 1 (because the optimal *ex-post* decision is always to service debt payments). Increasing $\bar{\omega}$ therefore only relaxes the borrowing constraint. As a result, the value function is increasing on $[0, \omega_1]$.
- For $\bar{\omega} \in (\omega_1, \omega_2]$, risk-taking ($\theta_1 = 1$) is optimal, along with a randomization over default regimes ($\lambda_2^H = 1$, $\lambda_2^L = 0$). The bond price also remains constant over this range (because the optimal *ex-post* decision remains constant), but at a lower bond price of $1/2$. Increasing $\bar{\omega}$ on the range $(\omega_1, \omega_2]$ therefore only relaxes a constraint, explaining the increase in the value of the optimal plan on this range.
- For $\bar{\omega} > \omega_2$, default becomes optimal in both states and the bond price therefore falls to zero. In turn this means there is no value to borrowing at all. This is never optimal and the Figure 2.7 therefore only covers the range $\bar{\omega} \in [0, \omega_2]$.

The change in the bond price at $\omega_1$ explains the discontinuity in the value function at this point. If the bond price did not change, $\omega_1$ would represent exactly the point of indifference between the risk-sharing and risk-taking plans described above. However, since the bond price falls, borrowing beyond $\omega_1$ is more expensive, and this leads to the discontinuity.

[24] For details of how the thresholds $\omega_1$ and $\omega_2$ are found under log-utility, see the proof of Proposition 6 in the Appendix C.

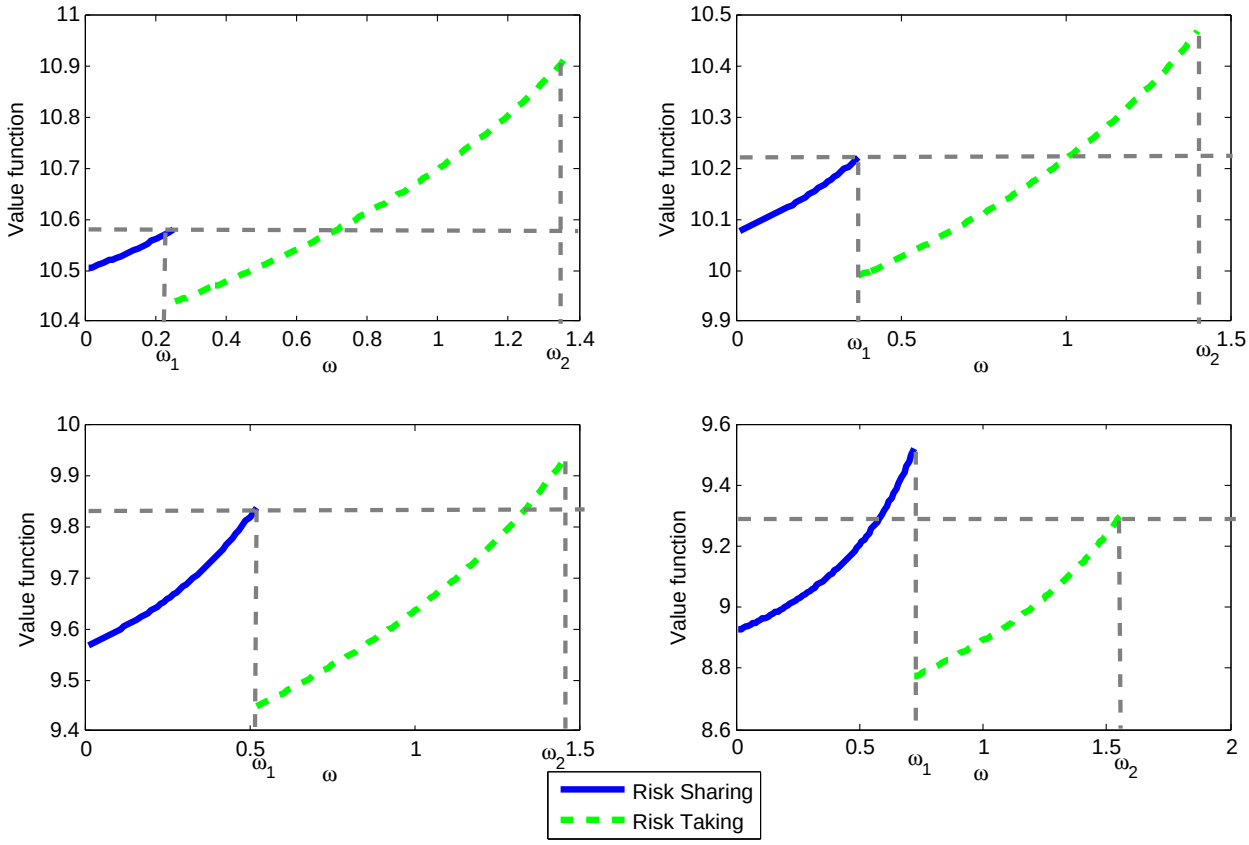



**Figure 2.7:** *ECE: Risk Taking Behavior*

Now suppose that the planner for the open economy could choose the collateral constraint $\bar{\omega}$ to maximize welfare. It is clear from the description and the diagram that only one of two choices could ever be optimal: $\omega_1$ or $\omega_2$. Proposition 4 shows that, in an ECE, the problem facing the planner is exactly this choice between $\omega_1$ and $\omega_2$. At $\omega_1$ the price of borrowing is lower, but the constraint on borrowing is more restrictive. At $\omega_2$ the price of borrowing is higher, but the constraint on borrowing is less restrictive. Which is better depends on how the benefits of risk-sharing (which matter at $\omega_1$) compare to the value of the default option (which matters at $\omega_2$).

The four panels of Figure 2.7 show how this comparison is affected by changing $|\underline{a} - A|$, holding all other parameters constant. Proposition 6 states that if $|\underline{a} - A|$ is sufficiently small, the default option is sufficiently valuable to induce risk-taking in equilibrium.

This is seen in the top-left panel, where $\underline{a} = A$. $|\underline{a} - A|$ then increases as we move to the top-right and bottom-left panels. Note that as the default option loses value, the primary change is that $\omega_1$ increases. The reason is that, as default becomes less valuable, risk-sharing is optimal over a larger range of collateral constraints. Eventually, in the bottom-right panel, $\omega_1$ is sufficiently large so that risk-sharing becomes optimal. The four panels of the figure therefore help to illustrate one of the key insights of the model. There is a trade-off between risk-sharing and default. As the penalties for default in terms of lost productivity increase ($|\underline{a} - A|$ increases), the incentives for risk-sharing increase as well. This is a direct link between risk-sharing and default that is consistent with the empirical correlation between consumption risk-sharing and external credit-risk discussed in the introduction.

## 2.4 Conclusion

This paper has studied a simple 2 period model of an open economy that has *ex-ante* opportunities to share consumption risks with a foreign sector, and an *ex-post* policy decision about default on external debts. The model highlights a general trade-off between risk-sharing and the option value of default. This trade-off can lead to endogenous risk-taking: Even if the country is risk-averse and full insurance against productivity shocks is possible, the optimal plan may keep consumption volatile because the exposure to shocks is crucial to the option value of default.

The model relates the trade-off between risk-sharing and default options to the external debt to capital ratio, and identifies a source of threshold effects that enters into consumption risk-sharing incentives through the credit-risk on external debt. The model therefore has quantifiable implications that can be be used to guide and organize empir-

ical analysis on two well-documented puzzles regarding emerging economies: (1) the apparent lack of international consumption risk-sharing in the wake of financial integration, and (2) the history of "serial default" on sovereign and external debt obligations. Establishing an empirical connection between these puzzles would require a more detailed analysis than I have provided here, but casual observation of the data suggests that some relationship exists and that it is consistent with the implications of the model. The analysis of this paper therefore provides one way to understand theoretically why there may be a direct link between the diverse risk-sharing and default behaviors of different emerging economies.

CHAPTER 3

# CONSUMPTION RISK-SHARING AND THRESHOLDS OF CAPITAL MARKET INTEGRATION BY EMERGING ECONOMIES

## 3.1 Introduction

While there has been a large increase in capital inflows resulting in higher levels of cumulated capital stocks in emerging economies over the past three decades, it is not yet entirely clear what the consequences of capital market integration have been. It was hoped, for example, that integration into international capital markets would promote consumption risk-sharing in emerging economies, reducing volatility of consumption growth rates relative to output growth rates. The potential welfare gains from reduced consumption volatility are particularly high in emerging economies, where volatility has traditionally been significantly greater.[1] However, on balance, the empirical evidence seems to suggest that consumption risk-sharing has not improved much in emerging economies, despite the wave of financial globalization, and there is some evidence that consumption volatility has actually *increased* in emerging markets (Kose et al., 2003, 2007; Bai and Zhang, 2012).

Risk-sharing in industrialized economies is also imperfect (Backus et al., 1992; Canova and Ravn, 1996; Pakko, 1998; Ambler et al., 2004), but has improved significantly with greater integration of financial markets (Obstfeld, 1994b; Pakko, 1998; Demyanyk et al., 2008).[2] The surprising finding for emerging economies is not just that

[1] For example, Athanasoulis and van Wincoop (2000) estimate that eliminating idiosyncratic consumption uncertainty (relative to world average riskiness) would have the same benefit as a 6.6% permanent increase in the level of per capita consumption of a typical emerging economy.

[2] Backus et al. (1992); Canova and Ravn (1996); Ambler et al. (2004) all study cross-country consumption correlations in industrialized countries and reach the conclusion that risk-sharing remains low relative to the predictions of a standard Arrow-Debreu contingent claims economy. Obstfeld (1994b) uses a sample of G-7 countries for the period 1950-1988 and concludes that for both cross-country con-

risk-sharing remains small, but that it has not improved with *de jure* or *de facto* measures of financial integration.[3] For example, Kose et al. (2007) study patterns of consumption risk-sharing in industrialized and emerging economies and document evidence that increased capital flows improved consumption risk-sharing in industrialized economies but not in emerging economies.[4]

In this paper, I explore whether the lack of response of consumption risk-sharing in emerging economies to changes in cross-border capital stocks may be due to the presence of threshold effects. The previous literature studying consumption risk-sharing is based largely on linear specifications of the relationship between capital flows and stocks and measures of consumption risk-sharing, but numerous authors have suggested that their results are indicative of the presence of threshold effects (e.g., Kose et al., 2003). The empirical analysis in this paper confirms the pre-existing intuition of the presence of threshold effects. Quantitative results differ across asset classes, but I document a common and pervasive qualitative feature of the data. Whether the focus is on debt, FDI or total capital stocks, there are in general three regimes. The first, when the measure of integration is low, involves minimal risk-sharing. The third, when measures

sumption growth correlations and the correlation between domestic consumption growth and the world component of consumption (output) growth, these economies are unable to accrue perfect risk sharing but that risk-sharing has improved significantly. Pakko (1998) also compares the correlation between domestic consumption growth and output growth with the correlation between domestic consumption growth and world output growth, and reaches the same conclusion. Demyanyk et al. (2008) document significant improvements in risk-sharing across EU economies, and significant positive effects of intra EU capital flows on risk-sharing.

[3] *De jure* measures of financial integration (openness) attempt to capture the legal restrictions on cross-border capital flows. Measures have been proposed by Edwards (2001), Chinn and Ito (2008), Quinn (1997) and Edison et al. (2002). *De facto* measures are based on actual cross-border capital flows or cumulated measure of inflows, and include the positive sum of items in the capital account (often viewed relative to GDP).

[4] (Kose et al., 2003, 2007) employ a variety of measures of consumption risk sharing for 72 economies for the sample period of 1960-2004. They divide the full sample of these countries into three sub-groups of countries: industrial countries (21), emerging markets (22) and other developing countries (33). They conclude that advanced economies have accrued better risk sharing during the sample period. Similarly, Bai and Zhang (2012) found that the coefficient estimated by regressing domestic consumption growth on domestic output growth is lower and the coefficient of domestic consumption growth on world consumption growth is higher for the industrialized countries than for emerging economies, suggesting greater risk-sharing in the developed economies.

of integration are high, involves imperfect but significant (both statistically and economically) risk-sharing. However, intermediate to these thresholds is a regime in which risk-sharing is lowest and in many cases *negative*. Moreover, a significant number of emerging economies fall in the intermediate range for the sample period 1985 – 2007, while most industrialized economies are consistently in the high regime. Only for FPI liabilities is the logic of regimes reversed (with an intermediate regime where risk-sharing is greatest), but this affects very few emerging economies. The results are therefore suggestive of the idea that emerging economies may not yet have reaped the gains of greater consumption risk-sharing because their economies need to integrate *further*, in order to cross threshold effects in the development stage of capital market integration.

To identify threshold effects, I study a panel data set of emerging and industrialized economies from 1985 – 2007.[5] The baseline empirical model is based on a regression specification used by Demyanyk et al. (2008) to estimate consumption risk-sharing in EU and EMU countries. Their specification captures the mechanism of risk-sharing by estimating whether the country level consumption growth rates are delinked from country level output growth rates, specifically in a panel controlling for individual (and possibly time) fixed-effects. Demyanyk et al. (2008) then study linear effects of different types of foreign assets on consumption risk-sharing through interaction terms. Instead, I augment the baseline specification to estimate possible threshold effects arising from levels of external debt, FDI, FPI or total foreign liabilities (all relative to GDP). The estimation of threshold effects employs a novel method for threshold regressions developed for non-dynamic panels with individual specific fixed effects by Hansen (1999). The key feature of the approach is that threshold effects are determined endogenously based on an iterative bootstrap method, rather than being imposed exogenously on the data.

[5]The methodology employed for identification of threshold effects is appropriate only for balanced panels, and lack of data availability therefore hinder a study of a larger sample period.

Following Kose et al. (2007), I focus on threshold effects in terms of different types of capital liabilities: Debt, FDI, FPI, and total liabilities (all relative to domestic GDP).[6] Most classes of stocks of capital liabilities exhibit the same three regimes: Low risk-sharing initially, an intermediate high volatility regime, and significant risk-sharing beyond an upper threshold value. FPI inflows on the other hand exhibit a risk sharing regime in the intermediate range of threshold effects. Confidence regions for threshold values are generally quite small, and results remain significant across the confidence regions, at least on a sub-sample restricted to emerging economies. The advantage of the endogenous threshold estimation is that the identification of the three regimes does not come from a prior assumption of their existence, but is identified from standard empirical optimization from the data.

The outline of the paper is as follows. Section 3.2 discusses related literature. Section 3.3 outlines the data used, with detailed descriptions given in the Appendix B. Section 3.4 gives details of the empirical methodology. Section 3.5 presents the results, Section 3.6 compares these results with common alternative non-threshold specifications and Section 3.7 concludes.

## 3.2 Related Literature

There is a large literature on consumption risk-sharing in industrialized economies (Obstfeld, 1994b; Olivei, 2000; Kalemli-Ozcan et al., 2003; Demyanyk et al., 2008; Melitz and Zumer, 1999; Asdrubali et al., 1996; Bengui et al., 2012). The consensus from this literature is that consumption risk-sharing is small, relative to the benchmark model predictions derived from a complete markets Arrow-Debreu contingent claims economy.

[6] I also consider capital assets but – perhaps because these are smaller in magnitude for emerging economies – threshold effects in terms of foreign assets are less significant.

However, consumption risk-sharing has increased over the past 20-30 years, and higher *de facto* capital market integration has increased the consumption risk-sharing across industrialized economies. For example, (Obstfeld, 1994b) document the later with focus on G7 economies, while (Demyanyk et al., 2008) document similar findings for EU economies.

More recently, there has also been a focus on consumption risk-sharing in emerging economies. Kose and Prasad (2010) and Bai and Zhang (2012) show that, relative to industrialized countries, consumption risk-sharing in emerging economies is (1) small, (2) appears much less responsive to an increase in financial market integration. For the latter, *de jure* measures of capital market integration, as well as *de facto* measures such as FDI, FPI or external debt liabilities relative to GDP are considered. Of the various asset types, external debt, *Kose:2010* find that external debt is the least conducive to risk-sharing, but the risk-sharing benefits of increased FDI and FPI inflows are also negligible. For a summary of predictions, methodologies and results on consumption risk-sharing in industrialized and emerging economies see, e.g., Kose and Prasad (2010) or Islamaj (2008).

While the empirical findings on consumption risk-sharing may be viewed as casting capital market integration in a negative light, e.g., Kose et al. (2007) instead suggest that they may indicate that the process of integration in emerging economies has not gone far enough to realize potential gains of consumption risk-sharing. This view is supported by findings in Kose et al. (2007), who use quadratic interaction terms and find that the benefits of financial integration in terms of international risk sharing are accrued only after a certain thresholds of financial openness is reached. Similarly, Kose et al. (2011) identify threshold effects of financial depth and institutional quality for the effects of capital market integration on output growth rates using parametric and non-parametric

approach. A synthesis of this empirical literature therefore already indicates the potential for threshold effects of capital market integration on welfare relevant measures such as output growth and international consumption risk-sharing. However, all of the existing literature uses exogenous specifications of threshold effects to in turn demonstrate the existence of threshold effects. The primary contribution of the present paper can therefore be seen in identifying threshold effects endogenously based on a systematic methodology developed by Hansen (1999) to identify threshold effects from the data.

## 3.3 Data

The analysis in this paper studies international consumption risk-sharing using a balanced panel dataset for industrialized and emerging economies from 1985 – 2007. A detailed description of the variables in the dataset along with their sources is provided in Table 3.1. The basic datasets are merged from the World Bank's Development Indicators and Updated and Extended "External Wealth of Nations" Dataset.[7]. Per capita real GDP, per capita real GNI and per capita final consumption which is the sum of government and private consumption are from the former dataset, while stocks of financial liabilities (Debt Liability, Foreign direct investments (FDI Liability), Foreign portfolio investment (FPI Liability) and Total liabilities)and assets (Debt, Foreign direct investments (FDI Assets), Foreign portfolio investment (FPI Assets) and Total assets) are from Lane and Milesi-Ferretti (2007). Financial variables are all normalized by the GDP measured in current US dollars in the analysis, while an alternative set of analysis also uses normalization with respective total liabilities or total assets.

The data set has annual data over the period 1985-2007 for 20 industrialized

[7]See Lane and Milesi-Ferretti (2007) for detailed description and collection methodology employed for "External Wealth of Nations" Dataset

economies and 25 emerging economies. The list of countries is provided in Table B.1 in the Data Appendix B.[8] Table B.2 gives summary statistics for the variables, including mean, median, upper and lower quartiles for each type of capital inflow (average over all years) in the sample. The analysis in this paper requires a balanced dataset therefore the size of the data set is based on the availability of the data for maximum number of countries. The main idea of the paper is to capture the threshold effects in terms of financial inflows on consumption risk-sharing. The next Section, provides the underlying methodology employed for identifying the threshold effects in international consumption risk sharing.

**Table 3.1:** *Data Sources*

| Variable | Source |
|---|---|
| Stock of External Liabilities | EWN II |
| Stock of External Assets | EWN II |
| Stock of FDI liabilities | EWN II |
| Stock of Equity Liabilities | EWN II |
| Stock of External Debt Liabilities | World Bank |
| Stock of FDI Assets | EWN II |
| Stock of Equity Assets | EWN II |
| Stock of External Debt Assets | EWN II |
| GDP | WDI-WB |
| GDP per capita | WDI-WB |
| GNI per capita | WDI-WB |
| Consumption per capita | WDI-WB |

Notes: WDI-WB: World Development Indicators-World Bank ;
EWNII: Updated External Wealth of Nations ;
All data from EWN II and WDI is in current price US dollar.

[8]Categorization of countries as emerging economies is based on income limits however, these calculation can change from year to year which may result into a given country qualifying under the legislative and administrative criteria one year as emerging economy but not the next year. Therefore, The World Bank has not established a fixed list of emerging market countries. Therefore, this paper uses the list of emerging economies based on the availability of the data as well as the country being categorized as emerging market in either one of the following indexes: Columbia University EMGP List; FTSE list; MSCI list; S&P list; Dow Jones list; Frontier Strategy Group (F10) list; BBVA Research and Emerging Markets Index.

## 3.4 Methodology

I first describe a benchmark empirical specification for estimating international consumption-risk sharing based on Kalemli-Ozcan et al. (2003); Demyanyk et al. (2008). I then describe a methodology for identifying and estimating threshold effects in panel data sets introduced in Hansen (1999). Finally, I outline a synthesis of these two methodologies that can be employed to identify and estimate threshold effects of capital market integration on international consumption risk-sharing.

### 3.4.1 International Consumption Risk Sharing

The most commonly used measures of consumption risk-sharing in the literature (e.g., Kose et al., 2003, 2011; Bai and Zhang, 2012; Kalemli-Ozcan et al., 2003; Demyanyk et al., 2008), capture the average co-movement of country specific consumption per capita growth rate with country specific GDP per capita growth rate. In the following, $i$ denotes the country index and $t$ the time index for a balanced panel of observations on $I$ countries over $T$ time periods. Per capita consumption (government and private) is denoted by $c_{it}$, and aggregate consumption of the total countries in the sample is denoted by $c_t := \sum_i c_{it}$ for all $t \in T$. The country specific consumption growth rate is therefore given by:

$$[log(c_{it}) - log(c_{i(t-1)}] - [log(c_t) - log(c_{t-1})] := \Delta log(c_{it}) - \Delta log(c_t) \ . \tag{3.1}$$

The analysis uses country specific growth rates because aggregate shocks cannot be eliminated from risk-sharing, therefore the aggregate component of consumption growth rate is deducted from the country specific growth rate.

In a similar manner, country $i$'s year $t$, per capita GDP is denoted by $GDP_{it}$, and

aggregate GDP of the total countries in the sample is denoted by $GDP_t := \sum_i GDP_{it}$ for all $t \in T$. The country specific GDP per capita growth rate is captured by the following expression:

$$[log(GDP_{it}) - log(GDP_{i(t-1)}] - [log(GDP_t) - log(GDP_{t-1})] := \Delta log(GDP_{it}) - \Delta log(GDP_t) \quad (3.2)$$

Again, the aggregate component of GDP per capita growth rates are deducted from the country specific GDP growth rates. International consumption risk-sharing is then measured using the correlation between these two measures of country specific growth rates of consumption and output. In the event of perfect risk-sharing the correlation between these growth rates should be zero and a correlation of unity is interpreted as no risk-sharing within the sample. The main specification for consumption risk sharing with country specific fixed effects can therefore be written as:

$$\Delta log(c_{it}) - \Delta log(c_t) = \mu_i + \beta_{gdp}(\Delta log(GDP_{it}) - \Delta log(GDP_t)) + \epsilon_{it} \ , \quad (3.3)$$

where $\mu_i$, is a country specific fixed effect and $\epsilon_{it}$ is an error term, assumed to be conditionally *i.i.d* normally distributed across $(i, t) \in I \times T$.

Demyanyk et al. (2008) extended the benchmark specification outlined above to study whether consumption and income risk-sharing has increased due to the recent increase in foreign equities and portfolios in the member states of the EU. This extended version follows Melitz and Zumer (1999) to incorporate risk-sharing through foreign financial assets and liabilities resulting into a specification as follows:

$$\Delta log(c_{it}) - \Delta log(c_t) = \mu_i + \beta(\Delta log(GDP_{it}) - \Delta log(GDP_t)) + \epsilon_{it} \ , \quad (3.4)$$

where they impose structure on the coefficient $\beta$, allowing it to vary over time, countries and through foreign asset holdings:

$$\beta = \beta_{gdp} + \beta_t t + \beta_{FL}(FL_{it} - \bar{FL}) \ . \quad (3.5)$$

In (3.5), $FA_{it}$ denotes the capital account entry for a generic class of foreign assets or liabilities in country $i \in I$ at time $t \in T$; and $\bar{FA}$ is the average across countries and years. The structure includes a time trend in order to guard against any trend in assets and liabilities so that the analysis does not capture the changing trend of risk-sharing that may be result of any other developments in the national economies. The substitution of $\beta$ in the final specification 3.4 therefore yields:

$$\begin{aligned} \Delta log(c_{it}) - \Delta log(c_t) &= \mu_i + \beta_{gdp}(\Delta log(GDP_{it}) - \Delta log(GDP_t)) \\ &+ \beta_t t(\Delta log(GDP_{it}) - \Delta log(GDP_t)) \\ &+ \beta_{FL}(FL_{it} - \bar{FL})(\Delta log(GDP_{it}) - \Delta log(GDP_t)) + \epsilon_{it} \ . \quad (3.6) \end{aligned}$$

The estimated value of $(1 - \beta_{gdp})$ captures the average amount of consumption risk-sharing within the group of countries; $\beta_t$ captures time trends; while $\beta_{FL}$ captures the effect of changes in foreign liability or asset position on consumption risk-sharing. $1 - \beta_{gdp} - \beta_t t - \beta_{FL}(FL_{it} - \bar{FL})$ then measures the amount of consumption risk-sharing obtained in period $t$ by country $i$.

Similar to the above methodology, the analysis in this paper is also based on fixed effects model and uses the specification (3.6) but with threshold effects of liability (or asset) positions in lieu of the linear-interaction specification of foreign asset effects in (3.6).[9] At a basic level, this simply involves placing a different structure on the coefficient $\beta$ in (3.4). But how should the threshold levels be determined? Much of the literature on threshold effects uses mean, median or quantile values for thresholds, and while this may often be a convenient approximation, it is *ad hoc* and does not take into account the optimization on the part of economic agents. I, therefore follow an alterna-

[9]In considering a sub-sample of emerging economies alone, means of consumption and GDP are taken for the whole sample. This means that consumption risk-sharing is viewed relative to the whole set of countries include industrialized ones, which both seems economically more relevant and is more appropriate when a large share of the capital inflows originate from the industrialized economies into emerging economies.

tive method for identification of endogenous threshold effects based on the methodology introduced in Hansen (1999).

### 3.4.2 Threshold Effects in Non-Dynamic Panels

Hansen (1999) develops econometric techniques for regression functions that are not identical across all observations in a sample and differ depending on the discrete classes they fall into. The technique is developed for balanced panel data sets with country fixed effects based on least square estimation. Thresholds are identified via an iterative bootstrap method, which also constructs consistent confidence intervals for the threshold parameters based on the asymptotic distribution of the error term. The statistical significance of threshold parameters is assessed on the basis of the bootstrap method. Application of other threshold models in the literature is either based on an exogenous threshold variables or endogenous thresholds. The former might not be justified when the threshold is clearly a decision variable for the agent while the later may bias the results. Therefore, this method allows estimation of parameters from the sample which also has clear and tractable relevance for policy related issues.

The structural equation of interest is of the following form:

$$y_{it} = \mu_i + \beta_q^{1'} x_{it} I(q_{it} \leq \gamma) + \beta_q^{2'} x_{it} I(q_{it} > \gamma) + \epsilon_{it} \tag{3.7}$$

where I(.) is the indicator function, the subscript $i \in I$ indexes the individual and the subscript $t \in T$ indexes time. In the first iteration, the observations are divided into two regimes depending on the threshold variable, $q_{it}$. The division of the regimes is a result of first stage minimization of the sum of squared errors that estimates the first threshold indicated as $\gamma_1$. The corresponding regimes can be identified based on the regression slopes which are denoted by $\beta_q^1$ and $\beta_q^2$. The basic identification assumption is that $x_{it}$

and $q_{it}$ are not time-invariant.[10] Fixing the first stage threshold $\gamma_1$, the second iteration again minimizes the sum of squared errors to estimate the second threshold denoted by $\gamma_2$, and tries to further divide the sample, continuing iterations until no further thresholds are identified. The method tests for the existence of threshold and further determines the number of thresholds which are estimated by least squares. The slope coefficients are estimated along with conventional OLS standard errors and white-corrected standard errors to test the significance of these slope coefficients.

In the above specification 3.7, the analysis sequentially tests for zero, one, two or three thresholds. The $F$-test statistics and the likelihood ratio along with bootstrap $p$ values indicate significance of the threshold parameters. If the corresponding bootstrap $p$ value is below the desired critical value, the null hypothesis of no threshold, one threshold, two threshold or three thresholds is rejected. Furthermore, the asymptotic confidence intervals for the threshold are then used to ascertain the certainty about the nature of the division based on the threshold parameters. Lastly, conventional OLS errors along with White corrected standard errors are used for the significance of the estimates.

The above methodology is flexible enough to extend the analysis to more than three threshold parameters. The analysis in this paper is based on the extended version of the threshold model. The next subsection presents the synthesis of the consumption risk-sharing methodology described in Section 3.4.1 and threshold effects in the non-dynamic panel data described in Section 3.4.2.

[10]For computational and econometric issues relating least square estimation and the non-standard asymptotic theory of inference refer to Hansen (1999).

### 3.4.3 Consumption Risk Sharing and Threshold Effects

The underlying specification for this paper is to test whether there exist any threshold effects based on foreign assets and liabilities for international consumption risk sharing. Demyanyk et al. (2008) use an interaction term of foreign assets/liabilities with the country specific output growth. This paper, instead of using interaction term, uses the approach of Hansen (1999) where foreign assets/liabilities are treated as threshold variables to test how the coefficient of the risk-sharing measure, captured by $(1-\beta_{FL})$ is affected by different regimes of levels of foreign assets and liabilities. Formally,

$$\begin{aligned}\Delta log(c_{it}) - \Delta log(c_t) = \mu_i \quad &+ \quad \beta_t t(\Delta log(GDP_{it}) - \Delta log(GDP_t)) \\ &+ \quad \beta^1_{FL}(\Delta log(GDP_{it}) - \Delta log(GDP_t))(FL_{it} \leq \gamma_1) \\ &+ \quad \beta^2_{FL}(\Delta log(GDP_{it}) - \Delta log(GDP_t))(\gamma_1 < FL_{it} \leq \gamma_2) \\ &+ \quad \beta^3_{FL}(\Delta log(GDP_{it}) - \Delta log(GDP_t))(\gamma_2 < FL_{it} \leq \gamma_3) \\ &+ \quad \beta^4_{FL}(\Delta log(GDP_{it}) - \Delta log(GDP_t))(\gamma_3 < FL_{it}) + \epsilon_{it} \quad (3.8)\end{aligned}$$

where $\gamma_1 < \gamma_2 < \gamma_3$. Note that the basic specification simply places a different structure on $\beta$ in (3.4), based on threshold effects instead of linear interaction effects. The specification also captures time trends as suggested by Demyanyk et al. (2008) to control for changing trend of risk-sharing that may be result of any other developments in the national economies. The estimation of threshold effects and confidence regions is then based on Hansen's iterative bootstrap procedure, which produces robust and consistent estimates of threshold values. The interpretation of the parameters for consumption risk-sharing via financial liabilities are calculated as $(1-\beta_{FL})$, where respective $\beta$'s differ on the basis of various regimes that are based on financial assets or liabilities. As mentioned in Section 3.3, the consumption and output are per capita variables whilst financial variables are normalized by nominal GDP expressed as current US dollars.

More formally, under this specification, unlike (Demyanyk et al., 2008), the average consumption risk sharing, which is generically measured as $1 - \beta_t t - \beta^j_{FL}(FL)$ where $j$ represents the corresponding regime dependent coefficients, varies on the basis of regimes. However, this paper explores whether consumption risk sharing has improved by financial integration in emerging economies and therefore, the remainder of the analysis specifically focuses on regime dependent estimates and their implication of consumption risk sharing.

The approach in this paper uses different types of financial variables as threshold effects: External Debt, Foreign Direct Investments (FDI) , Foreign Portfolio Investments (FPI) and reserves represented by $FL$ in equation 3.8. The objective of the analysis is therefore to identify regimes for consumption risk-sharing based on the different asset classes, and estimate the amount of consumption risk-sharing achieved by a country in each regime. The next section presents the results of empirical estimation of (3.8) based on a panel data of emerging and industrialized economies from 1985-2007, and for various different asset classes. The first subsection provides results based on total liabilities for the full sample of industrialized and non-industrialized countries along with separate results for industrialized and emerging economies. The following subsections follow the same exposition with different threshold variables that are presented in the following order: Debt liabilities, FDI liabilities, FPI liabilities and lastly foreign assets. Corresponding regression tables and test statistics are provided in the Appendix B.

## 3.5 Results

I use the basic specification (3.8), looking at total liabilities (relative to GDP) as well as separate classes of liabilities, external Debt, FDI, and FPI. I also report estimation of

(3.8) for financial assets, but here there is no evidence of threshold effects largely because emerging economies have until recently not accumulated much in terms of foreign assets. The results reported are based on (1) the full sample of industrialized economies and emerging economies for the period 1985 – 2007, and (2) the sub-sample of emerging economies for the period 1985 – 2007.

The summary of results is presented in Table 3.2. Each column gives results for a different specification, which are discussed in detail below. A complete breakdown of the results of 4 iterations is then presented in Table B.3 in the Appendix B. The fourth iteration does not generate new thresholds in all cases, and so further iterations are not reported.

**Table 3.2:** *Summary of Results*

| Sample | Full | Emerging | Full | Emerging | Full | Emerging | Full | Emerging |
|---|---|---|---|---|---|---|---|---|
| Liabilities | Total | Total | Debt | Debt | FDI | FDI | FPI | FPI |
| Threshold 1 | 1.058066 | 1.058066 | 0.832957 | 0.9174 | 0.413596 | 0.423 | 0.035209 | 0.013589 |
| CI min | 1.011161 | 0.904716 | 0.79367 | 0.838934 | 0.311886 | 0.308665 | 0.012347 | 0.008575 |
| CI max | 1.627313 | 1.099032 | 1.496052 | 1.043659 | 0.422333 | 0.423 | 0.035765 | 0.017391 |
| Threshold 2 | 1.927312 | 1.868297 | 0.9174 | 1.412609 | 0.528463 | 0.528463 | 0.064819 | 0.065085 |
| CI min | 1.819795 | 1.868297 | 0.898123 | 1.190079 | 0.055132 | 0.655604 | 0.054797 | 0.054797 |
| CI max | 1.927313 | 1.950202 | 1.043391 | 1.614858 | 0.809554 | 0.812568 | 0.069974 | 0.071572 |
| Threshold 3 | X | X | X | X | X | X | X | X |
| CI min | X | X | X | X | X | X | X | X |
| CI max | X | X | X | X | X | X | X | X |
| F | 45.676992 | 30.082647 | 23.638476 | 29.038687 | 21.537517 | 12.709697 | 31.953343 | 33.823233 |
| Bootstrap P | 0.003333 | 0.01 | 0.006667 | 0.083333 | 0.016667 | 0.063333 | 0.003333 | 0.01 |
| $\beta_o$ | $-0.004966^{*}$ | $-0.005768^{*}$ | $-0.000145^{*}$ | $-0.00126^{*}$ | $-0.000963^{*}$ | $-0.002799^{*}$ | $-0.001903^{*}$ | $-0.000641^{*}$ |
| OLS SE | 0.004139 | 0.006065 | 0.00122 | 0.00194 | 0.001323 | 0.002056 | 0.004034 | 0.004929 |
| HET SE | 0.00513 | 0.007078 | 0.00196 | 0.002553 | 0.002133 | 0.002749 | 0.005242 | 0.005328 |
| $\beta_1^c$ | 1.028881 | 1.025681 | 1.023256 | 1.024563 | $1.035204^{*}$ | $1.056025^{*}$ | $1.095262^{**}$ | $1.130204^{***}$ |
| OLS SE | 0.030345 | 0.042494 | 0.015397 | 0.0244802 | 0.014873 | 0.023657 | 0.032327 | 0.041544 |
| HET SE | 0.042092 | 0.056508 | 0.022705 | 0.029675 | 0.026455 | 0.034858 | 0.046152 | 0.041994 |
| $\beta_2^c$ | $1.176755^{***}$ | $1.197422^{***}$ | $0.861046^{***}$ | $1.159799^{***}$ | $1.158254^{***}$ | $1.220955^{***}$ | $0.885002^{**}$ | $0.934577^{*}$ |
| OLS SE | 0.034819 | 0.048848 | 0.033926 | 0.036497 | 0.033314 | 0.050127 | 0.03259 | 0.037008 |
| HET SE | 0.045045 | 0.05903 | 0.049841 | 0.054071 | 0.040973 | 0.054683 | 0.049475 | 0.042797 |
| $\beta_3^c$ | 0.946235 | $0.94776^{*}$ | $1.086396^{**}$ | 1.046918 | $0.900305^{**}$ | $0.850547^{**}$ | $1.077082^{**}$ | $1.10035^{**}$ |
| OLS SE | 0.034575 | 0.046733 | 0.019293 | 0.03199 | 0.045691 | 0.09875 | 0.030307 | 0.037475 |
| HET SE | 0.034505 | 0.039325 | 0.03717 | 0.055607 | 0.058823 | 0.089957 | 0.045951 | 0.047307 |
| $\beta_4^c$ | X | X | X | X | X | X | X | X |
| OLS SE | X | X | X | X | X | X | X | X |
| HET SE | X | X | X | X | X | X | X | X |
| Observations | 1035 | 575 | 1035 | 575 | 1035 | 575 | 1035 | 575 |

* indicates coefficent is significantly different from 1 at 90% confidence interval.
** indicates coefficent is significantly different from 1 at 95% confidence interval.
*** indicates coefficent is significantly different from 1 at 99% confidence interval.

### 3.5.1 Total Liabilities

#### Full sample of countries

To read the results, start by looking at the estimation results for the full sample (first column of Table 3.2). Here, two statistically significantly different threshold values of the total liability to GDP ratio are identified from the complete Table B.3 in the Appendix B:

- Threshold 1 with a point estimate of $\approx$ 1.058 and a 99% confidence interval of $\approx [1.011, 1.627]$.
- Threshold 2 with a point estimate of $\approx$ 1.927 and a 99% confidence interval of $\approx [1.820, 1.927]$.

The $F$-test for a single threshold and double threshold for a full sample are highly significant with bootstrap $P$-value of 0.05 and 0.00, respectively presented in Table B.3. The complete summary Table B.3 in the Appendix B also reports a third threshold value of "Threshold 3" with a point estimate of $\approx$ 0.973 and a 99% confidence interval of $\approx (0.341, 0.973)$. However, the bootstrap $P$-value for the triple threshold regression is not significant at the 10% level, and so I indicate this with a $X$ in the summary Table 3.2. Only up to three thresholds are reported in the Appendix B becasue in all cases the third threshold is insignificant at the 10% level, and fourth thresholds were insignificant at the 25% level.

Although the confidence interval for Threshold 1 is quite large, it does not overlap with the 99% confidence inteval of Threshold 2, and so the estimation indicates the existence of 3 robust regimes, with different coefficients of risk-sharing (summarized also in Table 3.2):

- REGIME 1: Below Threshold 1, the estimate for risk-sharing is $(1-\beta_1) \approx -0.030$, which (with a White-error of $\approx 0.042$) is statistically but not economically different from 0, suggesting some negative risk-sharing (consumption volatility exceeds output volatility) but not in an economically significant way.[11]

- REGIME 2: Between Threshold 1 and Threshold 2, the estimate for risk-sharing is $(1-\beta_2) \approx -0.177$, which is both statistically and economically negative, because it indicates that the output growth rates are close to 20% *more* correlated than consumption growth rates. This suggests that there is significant excess volatility in the consumption growth rate for economies in REGIME 2.

- REGIME 3: Above Threshold 2, the estimate for the risk-sharing coefficient is $(1-\beta_3) \approx 0.054$, which is statistically significantly greater than 0 (though statistically significantly smaller than 1). In REGIME 3, countries therefore achieve some limited risk-sharing. Although it is far from perfect risk-sharing, countries in REGIME 3 have consumption growth rates that are approximately 5% more correlated than output growth rates, indicating a small but not insignificant amount of risk-sharing.

Finally, Table 3.3 indicates the number of countries in each regime at each date, and Table B.4- B.5 in the Appendix B indicates for each country in the sample, in which years it fell into each of the regimes identified for each specification. It is apparent that a significant number of emerging economies fall into REGIME 2 for significant length of times, and that only a small number of emerging economies have successfully transitioned into REGIME 3 (e.g., Singapore, Ecuador, Jordan). Industrialized countries fell into REGIME 3 overwhelmingly for the whole sample period.

[11] A $*$ on the $\beta$ coefficient estimate in Table 3.2 indicates statistic significantly different from 1 at the 95% level.

**Table 3.3:** *Distribution of Emerging and Advanced Economies for Total Liabilities*

| country | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Emerging | | | | | | | | | | | | | | | | | | | | | | | | |
| Regime 1 | 19 | 19 | 19 | 20 | 20 | 22 | 21 | 22 | 21 | 22 | 22 | 22 | 23 | 19 | 17 | 19 | 19 | 18 | 18 | 17 | 20 | 20 | 20 | 459 |
| Regime 2 | 6 | 6 | 6 | 5 | 5 | 2 | 3 | 3 | 4 | 3 | 3 | 3 | 1 | 4 | 7 | 5 | 5 | 5 | 5 | 6 | 2 | 3 | 3 | 95 |
| Regime 3 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 1 | 1 | 1 | 2 | 2 | 2 | 3 | 2 | 2 | 21 |
| Advanced | | | | | | | | | | | | | | | | | | | | | | | | |
| Regime 1 | 16 | 16 | 16 | 16 | 14 | 14 | 14 | 15 | 13 | 13 | 14 | 13 | 11 | 9 | 7 | 6 | 5 | 2 | 2 | 2 | 2 | 2 | 1 | 223 |
| Regime 2 | 4 | 4 | 4 | 4 | 5 | 5 | 5 | 5 | 5 | 5 | 3 | 3 | 5 | 6 | 7 | 8 | 9 | 12 | 9 | 7 | 8 | 6 | 6 | 135 |
| Regime 3 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 2 | 2 | 3 | 4 | 4 | 5 | 6 | 6 | 6 | 6 | 9 | 11 | 10 | 12 | 13 | 102 |
| Total | | | | | | | | | | | | | | | | | | | | | | | | |
| Regime 1 | 35 | 35 | 35 | 36 | 34 | 36 | 35 | 37 | 34 | 35 | 36 | 35 | 34 | 28 | 24 | 25 | 24 | 20 | 20 | 19 | 22 | 22 | 21 | 682 |
| Regime2 | 10 | 10 | 10 | 9 | 10 | 7 | 8 | 8 | 9 | 8 | 6 | 6 | 6 | 10 | 14 | 13 | 14 | 17 | 14 | 13 | 10 | 9 | 9 | 230 |
| Regime 3 | 0 | 0 | 0 | 0 | 1 | 2 | 2 | 0 | 2 | 2 | 3 | 4 | 5 | 7 | 7 | 7 | 7 | 8 | 11 | 13 | 13 | 14 | 15 | 123 |
| Total | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 1035 |

### Emerging economies

To check whether threshold identification is overly affected by the presence of industrialized economies in REGIME 3, column 2 of Table 3.2 also reports estimation results for the sub-sample of emerging economies (again with total liabilities as the threshold variable). For this sub-sample, Threshold 1 remains unaffected (because more recently there are almost no industrialized countries falling into REGIME 1), while the second threshold value decreases marginally to $\approx$ 1.868. 99% confidence intervals are also much tighter ($\approx [0.905, 1.099]$ for Threshold 1, and $\approx [1.868, 1.950]$ for Threshold 2). The estimate of the risk-sharing coefficient in each regime is also very similar to the estimate on the full sample, with the only noticable change being a small *increase* in consumption volatility in REGIME 2.

Together, the result of the previous two specifications are indicative of the presence of strong threshold effects that lead to the presence of three different regimes For emerging economies with low total capital inflows (REGIME 1), there is little evidence of consumption risk-sharing. Emerging economies with sufficiently high total capital inflows (REGIME 3) achieve some limited but economically significant risk-sharing, reducing the volatility of consumption growth relative to output growth viz-a-viz the respective aggregates by just over 5 percentage points. However, there is an intermediate

regime (REGIME 2), in which consumption risk-sharing is actually negative, suggesting that in the transition towards capital market integration there is phase in which countries experience substantial excess consumption volatility arising from capital inflows. The remaining subsections look at how this relates to the pattern of capital inflows, and therefore gives results for each of the different general asset classes (external debt, FDI and FPI).

### 3.5.2 External Debt Liabilities

#### Full sample of countries

Results for external debt liabilities on the full sample are given in the third column of Table 3.2. Again, two statistically significantly different threshold values of the total liability to GDP ratio are identified:

- Threshold 1 with a point estimate of $\approx 0.833$ and a 99% confidence interval of $\approx [0.794, 1.496]$.
- Threshold 2 with a point estimate of $\approx 0.917$ and a 99% confidence interval of $\approx [0.898, 1.043]$.

The $F$-test for a single threshold and double threshold for a full sample are highly significant with bootstrap $P$-value of 0.03 and 0.00, respectively, presented in Table B.3. Identification of clear regimes in this case is problematic because of the substantial overlap between the confidence intervals of the threshold values. Using the point estimates the same three qualitative regimes emerge, but separation can not be made with sufficient confidence on the full sample. As a result, I again therefore look at the sub-sample

of emerging economies where threshold values can be identified with tighter confidence intervals.

**Table 3.4:** *Distribution of Emerging and Advanced Economies for Debt Liabilities*

| country | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Emerging | | | | | | | | | | | | | | | | | | | | | | | | |
| Regime 1 | 18 | 17 | 18 | 20 | 18 | 22 | 22 | 23 | 23 | 24 | 24 | 24 | 23 | 20 | 20 | 20 | 21 | 21 | 21 | 21 | 22 | 23 | 23 | 488 |
| Regime 2 | 2 | 3 | 2 | 1 | 3 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 3 | 2 | 1 | 0 | 0 | 1 | 0 | 0 | 23 |
| Regime 3 | 5 | 5 | 5 | 4 | 4 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 2 | 3 | 4 | 2 | 2 | 3 | 4 | 4 | 2 | 2 | 2 | 64 |
| Advanced | | | | | | | | | | | | | | | | | | | | | | | | |
| Regime 1 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 16 | 13 | 14 | 15 | 15 | 14 | 12 | 12 | 9 | 8 | 4 | 4 | 4 | 4 | 4 | 2 | 255 |
| Regime 2 | 0 | 2 | 0 | 3 | 0 | 0 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 2 | 22 |
| Regime 3 | 5 | 3 | 5 | 2 | 5 | 5 | 4 | 3 | 5 | 4 | 4 | 4 | 5 | 7 | 7 | 10 | 11 | 15 | 16 | 16 | 15 | 16 | 16 | 183 |
| Total | | | | | | | | | | | | | | | | | | | | | | | | |
| Regime 1 | 33 | 32 | 33 | 35 | 33 | 37 | 37 | 39 | 36 | 38 | 39 | 39 | 37 | 32 | 32 | 29 | 29 | 25 | 25 | 25 | 26 | 27 | 25 | 743 |
| Regime 2 | 2 | 5 | 2 | 4 | 3 | 1 | 2 | 1 | 2 | 2 | 1 | 1 | 1 | 3 | 2 | 4 | 3 | 2 | 0 | 0 | 2 | 0 | 2 | 45 |
| Regime 3 | 10 | 8 | 10 | 6 | 9 | 7 | 6 | 5 | 7 | 5 | 5 | 5 | 7 | 10 | 11 | 12 | 13 | 18 | 20 | 20 | 17 | 18 | 18 | 247 |
| Total | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 1035 |

### Emerging economies

Column 4 of Table 3.2 reports estimation results for the sub-sample of emerging economies using external debt liabilities as the threshold variable. For this sub-sample, the Threshold 1 point estimate is $\approx 0.917$ with a 99% confidence interval of $\approx [0.839, 1.044]$, and the Threshold 2 point estimate is $\approx 1.413$ with a 99% confidence interval of $\approx [1.190, 1.615]$. The double iteration is significant at the 10% level with an $F$-statitic of $\approx 29.039$. Since the two confidence intervals for estimates on the sub-sample do not overlap at all (and are also quite tight), it is possible to identify again three robust regimes, with different coefficients of risk-sharing (summarized also in Table 3.2):

- REGIME 1: Below Threshold 1, the estimate for risk-sharing is $(1-\beta_1) \approx -0.025$, which (with a White-error of $\approx 0.030$) is statistically but not economically different from 0, suggesting some negative risk-sharing (consumption volatility exceeds output volatility) but not in an economically significant way.
- REGIME 2: Between Threshold 1 and Threshold 2, the estimate for risk-sharing

is $(1-\beta_2) \approx -0.160$, which is both statistically and economically negative, because it indicates that the output growth rates are more than 15% *more* correlated than consumption growth rates. This suggests that there is significant excess volatility in the consumption growth rate for economies in REGIME 2.

- REGIME 3: Above Threshold 2, the estimate for the risk-sharing coefficient is $(1-\beta_3) \approx -0.047$, which is statistically significantly greater than 0. In REGIME 3, countries therefore also experience some excess volatility, reflecting in part the fact that emerging economies in general tend to have *negative* risk-sharing and that debt seems the least conducive form of capital inflows to reduce consumption volatility (Kose et al., 2007, see, e.g., the discussion in).

As with total assets, the threshold regression with external debt therefore identifies three regimes (at least in the sub-sample of emerging economies). While in general, external debt does not seem very conducive to risk-sharing, countries in the intermediate regime achieve the worst risk-sharing outcomes. Malik (2011) outlines a simple theoretical mechanism that can explain theses finding based on the interaction between external debt levels and incentives for cross-border diversification in the presence of default risks.

### 3.5.3 FDI liabilities

#### Full sample of countries

Results for FDI liabilities on the full sample are given in the fifth column of Table 3.2. Again, two statistically significantly different threshold values of the total liability to GDP ratio are identified:

- Threshold 1 with a point estimate of $\approx$ 0.414 and a 99% confidence interval of $\approx [0.312, 0.422]$.
- Threshold 2 with a point estimate of $\approx$ 0.528 and a 99% confidence interval of $\approx [0.055, 0.810]$.

The $F$-test for a double threshold for a full sample is highly significant with bootstrap $P$-value of 0.04. Identification of clear regimes in this case is also problematic because of the substantial overlap between the confidence intervals of the threshold values. Using the point estimates the same three qualitative regimes emerge, but separation can not be made with sufficient confidence on the full sample. As a result, I again therefore look at the sub-sample of emerging economies where threshold values can be identified with tighter confidence intervals.

**Table 3.5:** *Distribution of Emerging and Advanced Economies for FDI Liabilities*

| country | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Emerging | | | | | | | | | | | | | | | | | | | | | | | | |
| Regime 1 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 23 | 23 | 23 | 24 | 22 | 22 | 21 | 22 | 20 | 21 | 21 | 21 | 19 | 19 | 517 |
| Regime 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 2 | 1 | 2 | 1 | 3 | 2 | 1 | 1 | 3 | 0 | 22 |
| Regime 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 6 | 36 |
| Advanced | | | | | | | | | | | | | | | | | | | | | | | | |
| Regime 1 | 19 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 18 | 18 | 19 | 18 | 18 | 18 | 17 | 16 | 16 | 14 | 12 | 12 | 13 | 11 | 9 | 388 |
| Regime 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 1 | 2 | 2 | | 1 | 1 | 1 | 3 | 4 | 3 | 4 | 2 | 3 | 32 |
| Regime 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 3 | 3 | 3 | 4 | 5 | 3 | 7 | 8 | 40 |
| Total | | | | | | | | | | | | | | | | | | | | | | | | |
| Regime 1 | 43 | 44 | 44 | 44 | 44 | 44 | 44 | 44 | 42 | 41 | 42 | 41 | 42 | 40 | 39 | 37 | 38 | 34 | 33 | 33 | 34 | 30 | 28 | 905 |
| Regime 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 3 | 2 | 3 | 2 | 2 | 2 | 3 | 2 | 6 | 6 | 4 | 5 | 5 | 3 | 54 |
| Regime 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 3 | 4 | 5 | 5 | 5 | 6 | 8 | 6 | 10 | 14 | 76 |
| Total | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 1035 |

### Emerging economies

Column 6 of Table 3.2 reports estimation results for the sub-sample of emerging economies using FDI liabilities as the threshold variable. For this sub-sample, the Threshold 1 point estimate is $\approx$ 0.423 with a 99% confidence interval of $\approx [0.309, 0.424]$, and the Threshold 2 point estimate is $\approx$ 0.528 with a 99% confidence

interval of $\approx [0.465, 0.813]$. Since the two confidence intervals for estimates on the sub-sample do not overlap at all, it is possible to identify again three robust regimes, with different coefficients of risk-sharing (summarized also in Table 3.2):

- REGIME 1: Below Threshold 1, the estimate for risk-sharing is $(1-\beta_1) \approx -0.056$, which (with a White-error of $\approx 0.035$) is statistically but not economically different from 0, suggesting some negative risk-sharing (consumption volatility exceeds output volatility) but not in an economically significant way.
- REGIME 2: Between Threshold 1 and Threshold 2, the estimate for risk-sharing is $(1-\beta_2) \approx -0.22$, which is both statistically and economically negative, because it indicates that the output growth rates are more than 20% *more* correlated than consumption growth rates. This suggests that there is significant excess volatility in the consumption growth rate for economies in REGIME 2.
- REGIME 3: Above Threshold 2, the estimate for the risk-sharing coefficient is $(1-\beta_3) \approx 0.141$, which is statistically significantly greater than 0. In REGIME 3, countries therefore achieve considerable consumption risk-sharing (though still clearly less than perfect consumption risk-sharing). Countries in REGIME 3 have consumption growth rates that are almost 15% more correlated than output growth rates, indicating a considerable amount of risk-sharing and reduced volatility.

The estimation results for FDI liabilities on the sub-sample of emerging economies therefore confirm some intuition from the existing literature (Kose et al., 2003, 2007, e.g.,). FDI seems to be the most conducive form of capital inflows to consumption risk-sharing for countries that receive a high enough inflow of FDI. However, the intermediate regime for FDI also involves the largest consumption volatility (relative to output volatility). Since only a select few countries have "crossed" into REGIME 3, and a significant number are in REGIME 2 at dates in the sample period, full benefits

of capital market integration in terms of the increase that can be hoped for in terms of consumption risk-sharing have not yet been realized.

### 3.5.4 FPI liabilities

#### Full sample of countries

Results for FPI liabilities on the full sample are given in the seventh column of Table 3.2. Again, two statistically significantly different threshold values of the total liability to GDP ratio are identified:

- Threshold 1 with a point estimate of $\approx 0.035$ and a 99% confidence interval of $\approx [0.012, 0.036]$.
- Threshold 2 with a point estimate of $\approx 0.065$ and a 99% confidence interval of $\approx [0.055, 0.069]$.

The $F$-test for a single threshold and double threshold for a full sample are highly significant with bootstrap $P$-value of 0.01 and 0.00, respectively.

Since the 99% confidence intervals for Threshold 1 and Threshold 2 are quite tight and do not overlap, the estimation indicates the existence of 3 robust regimes, with different coefficients of risk-sharing (summarized also in Table 3.2). However, FPI liabilities seem to affect risk-sharing quite differently than other types of liabilities:

- REGIME 1: Below Threshold 1, the estimate for risk-sharing is $(1-\beta_1) \approx -0.095$, which (with a White-error of $\approx 0.046$) is statistically different from 0 and economically somewhat significant, suggesting some negative risk-sharing (consumption volatility exceeds output volatility).

- REGIME 2: Between Threshold 1 and Threshold 2, the estimate for risk-sharing is $(1-\beta_2) \approx 0.115$, which is both statistically and economically positive, because it indicates that the consumption growth rates are more than 10% more correlated than consumption growth rates. This suggests that there is significant consumption risk-sharing for intermediate FPI inflows.
- REGIME 3: Above Threshold 2, the estimate for the risk-sharing coefficient is $(1-\beta_3) \approx -0.078$, which is statistically significantly greater than 0, though economically small. In REGIME 3, countries therefore also achieve negative risk-sharing.

While for total liabilities, external debt and FDI three regimes could be summarized as no risk-sharing, negative risk-sharing and positive risk-sharing, the logic for FPI liabilities is reversed. Countries with both low and high FPI achieve less consumption risk-sharing, while it is countries with intermediate levels of FPI liabilities that achieve positive consumption risk-sharing gains. Column 8 of Table 3.2 shows that the same regime types are also identified on the sub-sample of emerging economies alone.

**Table 3.6:** *Distribution of Emerging and Advanced Economies for FPI Liabilities*

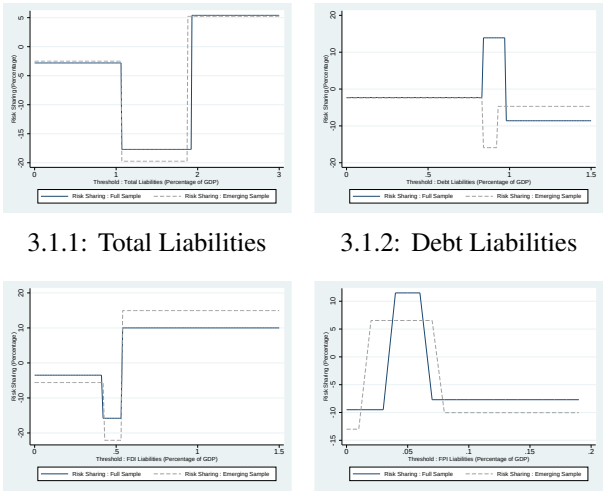
| country | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Emerging | | | | | | | | | | | | | | | | | | | | | | | | |
| Regime 1 | 23 | 22 | 24 | 22 | 22 | 22 | 19 | 19 | 15 | 12 | 15 | 11 | 12 | 10 | 10 | 10 | 10 | 13 | 9 | 8 | 7 | 6 | 5 | 326 |
| Regime 2 | 2 | 3 | 1 | 3 | 1 | 1 | 4 | 2 | 4 | 6 | 3 | 5 | 3 | 5 | 3 | 5 | 5 | 3 | 5 | 6 | 4 | 4 | 4 | 82 |
| Regime 3 | 0 | 0 | 0 | 0 | 2 | 2 | 2 | 4 | 6 | 7 | 7 | 9 | 10 | 10 | 12 | 10 | 10 | 9 | 11 | 11 | 14 | 15 | 16 | 167 |
| Advanced | | | | | | | | | | | | | | | | | | | | | | | | |
| Regime 1 | 13 | 12 | 14 | 11 | 10 | 9 | 7 | 10 | 5 | 4 | 3 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 107 |
| Regime 2 | 4 | 4 | 2 | 5 | 5 | 7 | 8 | 6 | 6 | 6 | 6 | 5 | 2 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 71 |
| Regime 3 | 3 | 4 | 4 | 4 | 5 | 4 | 5 | 4 | 9 | 10 | 11 | 13 | 17 | 19 | 18 | 18 | 18 | 18 | 19 | 19 | 20 | 20 | 20 | 282 |
| Total | | | | | | | | | | | | | | | | | | | | | | | | |
| Regime 1 | 36 | 34 | 38 | 33 | 32 | 31 | 26 | 29 | 20 | 16 | 18 | 13 | 13 | 11 | 11 | 11 | 11 | 14 | 10 | 8 | 7 | 6 | 5 | 433 |
| Regime 2 | 6 | 7 | 3 | 8 | 6 | 8 | 12 | 8 | 10 | 12 | 9 | 10 | 5 | 5 | 4 | 6 | 6 | 4 | 5 | 7 | 4 | 4 | 4 | 153 |
| Regime 3 | 3 | 4 | 4 | 4 | 7 | 6 | 7 | 8 | 15 | 17 | 18 | 22 | 27 | 29 | 30 | 28 | 28 | 27 | 30 | 30 | 34 | 35 | 36 | 449 |
| Total | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 1035 |

**Emerging economies**

Column 8 of Table 3.2 reports estimation results for the sub-sample of emerging economies using FPI liabilities as the threshold variable. For this sub-sample, the Threshold 1 point estimate is $\approx$ 0.014 with a 99% confidence interval of $\approx [0.009, 0.017]$, and the Threshold 2 point estimate is $\approx$ 0.065 with a 99% confidence interval of $\approx [0.054, 0.072]$. Since the two confidence intervals for estimates on the sub-sample do not overlap at all, it is possible to identify again three robust regimes, with different coefficients of risk-sharing (summarized also in Table 3.2):

- REGIME 1: Below Threshold 1, the estimate for risk-sharing is $(1-\beta_1) \approx -0.130$, which (with a White-error of $\approx$ 0.042) is statistically and economically different from 0, suggesting some negative risk-sharing (consumption volatility exceeds output volatility) but not in an economically significant way.
- REGIME 2: Between Threshold 1 and Threshold 2, the estimate for risk-sharing is $(1-\beta_2) \approx 0.065$, which is both statistically and economically positive (though quite small). This suggests that there is at least some consumption risk-sharing achieved by economies in REGIME 2.
- REGIME 3: Above Threshold 2, the estimate for the risk-sharing coefficient is $(1-\beta_3) \approx 0.100$, which is statistically significantly greater than 0 and economically somewhat significant. In REGIME 3, countries therefore have considerable *negative* consumption risk-sharing.

While the logic of the regimes for FPI is opposite to other asset classes, it is important to note that few emerging economies actually fall in REGIME 3 at all, and in fact most fall in REGIME 1. While the difference between FPI and other asset types is




3.1.1: Total Liabilities 3.1.2: Debt Liabilities

3.1.3: FDI Liabilities 3.1.4: FPI Liabilities

**Figure 3.1:** *Thresholds and Regimes*

therefore of some interest, it is difficult to say with how much confidence these estimates should be treated given the small number of observations that fall in REGIME 2 and 3.

The demarcation of regimes associated to the threshold estimates for each class of foreign liabilities and the total liabilities are summarized in the diagram 3.1. The bold line indicates the regime dependent extent of risk sharing by the Full sample (industrial and emerging economies) whereas the dotted line represents the regime dependent degree of risk sharing in emerging economies alone.

### 3.5.5 Foreign Assets

Finally, for completeness, Table 3.7 gives estimation results using foreign assets rather than liabilities as threshold variables. Again, results are reported for the full sample and the sub-sample of emerging economies. Results are also reported for total foreign assets and a division of assets into debt assets, foreign exchange reserves, foreign direct investments and foreign portfolio investments. Unlike for liabilities, however, in general no

significant threshold affects are identified here. Using Bootstrap $P$ values and the tightness of confidence intervals suggest that threshold effects of capital market integration seem to operate primarily through the liabilities side of the capital account.

## 3.6 Comparative Analysis

I conclude by providing some benchmark estimation results to allow for a comparison with the threshold specification in Section 5. I consider the following specifications:

- Specification 1:

$$\Delta log(c_{it}) - \Delta log(c_t) = \mu_i + \beta_{gdp}(\Delta log(GDP_{it}) - \Delta log(GDP_t)) \,. \quad (3.9)$$

  Where $\mu_i$ indicates that country fixed effects is employed.

- Specification 2 - 5:

$$\begin{aligned} \Delta log(c_{it}) - \Delta log(c_t) &= \mu_i + \beta_{gdp}(\Delta log(GDP_{it}) - \Delta log(GDP_t)) \\ &+ \beta_t t(\Delta log(GDP_{it}) - \Delta log(GDP_t)) \\ &+ \beta_{FL}(FL_{it} - \bar{FL})(\Delta log(GDP_{it}) - \Delta log(GDP_t)) + \varepsilon_{it} \end{aligned} \quad (3.10)$$

  where $\mu_i$ indicates fixed effects and FL represents different classes of foreign liabilities. Specification 2 - 5 follow the same exposition as specification 1 with two additional interaction terms with country specific output growth rates, $\beta_{gdp}(\Delta log(GDP_{it}) - \Delta log(GDP_t))$: (1) Time and (2) Different financial openness variables that are presented in the following order: Total liabilities, Debt liabilities, FDI liabilities and FPI liabilities.

The above specifications are based on country fixed effects model. The analysis is based on the same dataset of 25 emerging economies used in the previous analysis

**Table 3.7:** *Assets: Threshold Regression Results*

| Sample | Full | Emerging | Full | Emerging | Full | Emerging | Full | Emerging | Full | Emerging |
|---|---|---|---|---|---|---|---|---|---|---|
| Single Threshold | Total | Total | Debt | Debt | FDI | FDI | FPI | FPI | FX | FX |
| Threshold 1 | 1.041208 | 1.041208 | 0.874821 | 0.894824 | 0.108493 | 0.067318 | 0.254263 | 0.008084 | 0.104611 | 0.103552 |
| CI min | 0.948885 | 0.951111 | 0.010301 | 0.008851 | 0.004871 | 0.002621 | 0.000174 | 0.000115 | 0.102896 | 0.01914 |
| CI max | 1.057048 | 1.06222 | 1.617812 | 0.894825 | 0.256187 | 0.212718 | 1.408247 | 1.277858 | 0.394279 | 0.417043 |
| F | 22.851309 | 22.404291 | 10.008132 | 10.555731 | 11.751508 | 9.42926 | 8.427642 | 8.130547 | 17.054216 | 13.048244 |
| Bootstrap P | 0.06 | 0.043333 | 0.193333 | 0.076667 | 0.166667 | 0.22 | 0.313333 | 0.233333 | 0.086667 | 0.07 |
| $\beta_t$ | -0.001668 | -0.003507 | -0.000416 | -0.002317 | 0.001784 | -0.00295 | 0.003149 | -0.004946 | 0.002312 | 0.002178 |
| OLS SE | 0.00421 | 0.006217 | 0.001327 | 0.002083 | 0.00124 | 0.002204 | 0.004128 | 0.005652 | 0.001256 | 0.001966 |
| HET SE | 0.005847 | 0.008124 | 0.002141 | 0.002825 | 0.002422 | -0.00295 | 0.007 | 0.006814 | 0.00218 | 0.002641 |
| $\beta_1^c$ | 1.018523 | 1.027544 | 1.028675 | 1.051972* | 1.023816 | 1.051681* | 1.024384 | 1.037128 | 1.029829 | 1.044664* |
| OLS SE | 0.028421 | 0.040113 | 0.014992 | 0.023991 | 0.014804 | 0.024059 | 0.028857 | 0.0361 | 0.014897 | 0.023515 |
| HET SE | 0.048826 | 0.063032 | 0.026632 | 0.035306 | 0.02685 | 0.036267 | 0.055111 | 0.055189 | 0.026947 | 0.034673 |
| $\beta_2^c$ | 1.138641*** | 1.188074*** | 1.10863** | 1.179394*** | 0.945536* | 1.144077*** | 0.882039* | 1.114281*** | 0.963372 | 0.959625 |
| OLS SE | 0.039407 | 0.057452 | 0.031979 | 0.051154 | 0.027065 | 0.043211 | 0.058129 | 0.045953 | 0.020599 | 0.031847 |
| HET SE | 0.05658 | 0.076909 | 0.049104 | 0.052833 | 0.040859 | 0.058476 | 0.075049 | 0.056523 | 0.034447 | 0.041107 |
| Double Threshold | Total | Total | Debt | Debt | FDI | FDI | FPI | FPI | FX | FX |
| Threshold 1 | 1.041208 | 1.041208 | 0.874821 | 0.009656 | 0.104518 | 0.067318 | 0.087412 | 0.002167 | 0.104611 | 0.021425 |
| Threshold 2 | 1.20039 | 1.132144 | 1.204214 | 0.894824 | 0.108493 | 0.071528 | 0.254263 | 0.008084 | 0.11197 | 0.103552 |
| CI min | 0.826476 | 0.826476 | 0.010301 | 0.008851 | 0.087822 | 0.000285 | 0.000174 | 0.000115 | 0.017717 | 0.01672 |
| CI max | 1.89118 | 1.174827 | 1.667224 | 2.080467 | 0.104519 | 0.92771 | 1.277859 | 1.277859 | 0.114088 | 0.417043 |
| F | 18.682958 | 14.815591 | 14.798391 | 5.328721 | 16.630234 | 6.096589 | 9.709044 | 11.258414 | 14.986711 | 11.572362 |
| Bootstrap P | 0.09 | 0.153333 | 0.076667 | 0.613333 | 0.033333 | 0.463333 | 0.226667 | 0.193333 | 0.106667 | 0.156667 |
| $\beta_t$ | -0.003515 | -0.001711 | -0.000962 | -0.003011 | -0.000242 | -0.002861 | -0.00066 | -0.004368 | 0.002196 | 0.000661 |
| OLS SE | 0.004175 | 0.00613 | 0.001325 | 0.002097 | 0.001332 | 0.002194 | 0.004296 | 0.00558 | 0.001247 | 0.002 |
| HET SE | 0.005906 | 0.007909 | 0.002161 | 0.002808 | 0.002142 | 0.003053 | 0.006008 | 0.00652 | 0.002183 | 0.002517 |
| $\beta_1^c$ | 1.029336 | 1.015235 | 1.033804 | 0.842919** | 1.032895 | 1.051105* | 1.030865 | 1.106034** | 1.03084 | 0.94095* |
| OLS SE | 0.028141 | 0.039563 | 0.014947 | 0.096187 | 0.014861 | 0.023946 | 0.028734 | 0.041694 | 0.06619 | 0.025232 |
| HET SE | 0.049411 | 0.061483 | 0.026717 | 0.080948 | 0.026218 | 0.036254 | 0.05207 | 0.061358 | 0.034534 | 0.039306 |
| $\beta_2^c$ | 1.196808*** | 1.539332*** | 1.158474*** | 1.06229** | 1.146574*** | 1.428465*** | 1.11265** | 0.985272 | 0.726073*** | 1.076814** |
| OLS SE | 0.04135 | 0.111598 | 0.034425 | 0.024333 | 0.034225 | 0.126059 | 0.041354 | 0.039176 | 0.06619 | 0.025232 |
| HET SE | 0.0598 | 0.077655 | 0.04036 | 0.03492 | 0.038213 | 0.161181 | 0.053416 | 0.056904 | 0.06405 | 0.035502 |
| $\beta_3^c$ | 0.966023 | 1.138982** | 0.9408 | 1.191838*** | 0.971504 | 1.131401** | 0.906977* | 1.110033** | 0.975178 | 0.979658 |
| OLS SE | 0.05724 | 0.05804 | 0.054913 | 0.051248 | 0.02763 | 0.043328 | 0.058325 | 0.045363 | 0.020688 | 0.03211 |
| HET SE | 0.067998 | 0.065195 | 0.061875 | 0.052513 | 0.03838 | 0.059123 | 0.070779 | 0.054539 | 0.034536 | 0.039308 |
| Triple Threshold | Total | Total | Debt | Debt | FDI | FDI | FPI | FPI | FX | FX |
| Threshold 1 | 0.835212 | 0.161609 | 0.010301 | 0.009656 | 0.020631 | 0.005058 | 0.019399 | 0.001444 | 0.021359 | 0.021425 |
| Threshold 2 | 1.041208 | 1.012243 | 0.874821 | 0.370319 | 0.104518 | 0.065698 | 0.087412 | 0.002167 | 0.10667 | 0.109167 |
| Threshold 3 | 1.20039 | 1.132144 | 1.204214 | 0.894824 | 0.108493 | 0.071528 | 0.090787 | 0.008084 | 0.11197 | 0.393554 |
| CI min | 0.823322 | 0.084955 | 0.010301 | 0.030843 | 0.001962 | 0.000285 | 0.000174 | 0.001444 | 0.009628 | 0.043624 |
| CI max | 0.907848 | 5.168669 | 2.418443 | 0.553935 | 1.010433 | 0.92771 | 1.408247 | 1.277858 | 0.438477 | 0.429646 |
| F | 16.530629 | 6.119402 | 8.20545 | 2.798267 | 10.760488 | 5.122871 | 8.75568 | 9.85155 | 9.615913 | 9.197658 |
| Bootstrap P | 0.113333 | 0.303333 | 0.2 | 0.84 | 0.206667 | 0.333333 | 0.343333 | 0.283333 | 0.143333 | 0.21 |
| $\beta_t$ | -0.000967 | -0.002747 | -0.001587 | -0.00331 | 0.001473 | -0.000376 | 0.000527 | -0.00857 | 0.001478 | 0.000518 |
| OLS SE | 0.004175 | 0.006296 | 0.001339 | 0.002102 | 0.00143 | 0.002435 | 0.00428 | 0.005517 | 0.001255 | 0.001979 |
| HET SE | 0.005876 | 0.008018 | 0.00217 | 0.002794 | 0.001889 | 0.002602 | 0.005879 | 0.007188 | 0.002139 | 0.002498 |
| $\beta_1^c$ | 1.02483 | 1.166377*** | 0.892959** | 0.843574** | 1.037241* | 1.071267** | 1.034924 | 1.087089* | 0.958581** | 0.941224** |
| OLS SE | 0.027814 | 0.072187 | 0.052673 | 0.096029 | 0.014848 | 0.025757 | 0.028494 | 0.042311 | 0.02836 | 0.038763 |
| HET SE | 0.049205 | 0.063524 | 0.045743 | 0.080637 | 0.026006 | 0.038701 | 0.05429 | 0.057514 | 0.025676 | 0.024987 |
| $\beta_2^c$ | 0.834373** | 1.015944 | 1.043359* | 1.074242** | 0.975406 | 1.006628 | 0.925963* | 1.29913*** | 1.046598* | 1.077954 |
| OLS SE | 0.057661 | 0.04053 | 0.015281 | 0.025382 | 0.0233 | 0.031063 | 0.046986 | 0.073194 | 0.015516 | 0.025061 |
| HET SE | 0.077037 | 0.062741 | 0.026707 | 0.036522 | 0.028729 | 0.030894 | 0.047782 | 0.109642 | 0.028534 | 0.035404 |
| $\beta_3^c$ | 1.179518*** | 1.250946 | 1.169644*** | 1.023767 | 1.116946*** | 1.327249** | 1.137257*** | 0.918559* | 0.694538*** | 0.99067 |
| OLS SE | 0.041079 | 0.095194 | 0.034529 | 0.03395 | 0.035292 | 0.123851 | 0.043708 | 0.043142 | 0.07064 | 0.031955 |
| HET SE | 0.061046 | 0.230603 | 0.04055 | 0.03406 | 0.033704 | 0.169201 | 0.047569 | 0.055512 | 0.058463 | 0.03945 |
| $\beta_4^c$ | 0.950117 | 1.149734** | 0.94905 | 1.196601*** | 0.949624* | 1.090437** | 0.959051 | 1.128767** | 0.984519 | 0.677384*** |
| OLS SE | 0.056675 | 0.05941 | 0.054787 | 0.051248 | 0.028331 | 0.046691 | 0.045589 | 0.042678 | 0.020725 | 0.107637 |
| HET SE | 0.067478 | 0.066137 | 0.061991 | 0.052411 | 0.035264 | 0.051826 | 0.052347 | 0.057839 | 0.033832 | 0.10923 |
| Observations | 1035 | 575 | 1035 | 575 | 1035 | 575 | 1035 | 575 | 1035 | 575 |

* indicates coefficent is significantly different from 1 at 90% confidence interval.

** indicates coefficent is significantly different from 1 at 95% confidence interval.

*** indicates coefficent is significantly different from 1 at 99% confidence interval.

to make the comparison apparent. The following subsections report results based on each specification as stipulated in Equations (3.9) and (3.10). $\beta_t$ corresponds to the the coefficient associated with the time trend, $1-\beta_{gdp}$ is the coefficient of risk sharing and the estimate of $-\beta_{FL}$ measures how much a unit change in the *de facto* measure of financial integration increases the amount of consumption risk sharing. Therefore, $(1-\beta_t t-\beta_{gdp}-\beta_{FL}(FL_{it}-\bar{FL}))$ captures the amount of consumption risk sharing obtained by country $i$ in period $t$. The coefficient associated with risk sharing attained through financial openness, if negative, would result in a better consumption risk sharing while the coefficient capturing time trend is only to guard against any trend of financial liabilities capturing the trend in consumption risk sharing in the sampled countries that may be due to other national developments.

**Table 3.8:** *Liabilities: Threshold Regression Results*

| | Emerging Specification 1 | Emerging Specification 2 | Emerging Specification 3 | Emerging Specification 4 | Emerging Specification 5 |
|---|---|---|---|---|---|
| Coefficients | Without FA | Total Liabilities | Debt | FDI | FPI |
| $\beta_t$ | X | -0.00277 | -0.00226 | -0.00364 | -0.00199 |
| OLS SE | X | 0.005184 | 0.005184 | 0.004656 | 0.005134 |
| $\beta_{gdp}$ | 1.040071* | 1.030684* | 1.031471* | 1.043565* | 1.059866* |
| OLS SE | .0232916 | 0.048196 | 0.049786 | 0.041344 | 0.043241 |
| $\beta_{FO}$ | X | 0.023883 | 0.028765 | 0.070834 | -0.12863 |
| OLS SE | X | 0.046745 | 0.06637 | 0.101728 | 0.271611 |
| R squared | 0.9427 | 0.9429 | 0.9429 | 0.9429 | 0.9428 |
| Total Observations | 575 | 575 | 575 | 575 | 575 |

* indicates statistical significance at 99%.
FA indicates financial liabilities normalized to GDP.
X indicates specification without these coefficients.

### 3.6.1 Specification 1:

This is a baseline specification that uses a simple mechanism for capturing risk sharing through the correlation between country specific consumption with country specific output growth rates. The results are reported in the first column of Table 3.8. As this specification does not include any time trend or financial openness measures, the first column indicates the unrelated coefficients with $X$. The results from this specification

show that $(1 - \beta_{gdp})$ is less than zero. It indicates almost no risk sharing for the time period 1985-2007 for the sample of emerging economies. Under this specification, the results reached will be very different than the results provided under the methodology that takes into account threshold effects of financial openness. One conclusion that is reached under this specification is that risk sharing has not improved for the sample period 1985 – 2007, however, under the threshold specification, with an exception of FPI, this results is only valid for the initial regime for emerging economies. Specification 1 therefore, is unable to show the full picture for risk sharing in emerging economies.

### 3.6.2 Specification 2-5:

However, Specification 1 does not capture any effect of the financial openness that has been in the process for the past two decades. In order to answer questions like whether consumption risk sharing has improved in the wake of globalization due to deepening of financial integration, the previous specification must be augmented to capture the risk sharing due to the integration of financial openness. As opposed to the methodology of threshold effects as used in this paper, I use a simple linear methodology to capture the consumption risk sharing through financial openness via an interaction terms of *de facto* measure of financial openness and growth rate of country specific output. This methodology s largely followed in the existing literature, (See for e.g., Demyanyk et al., 2008) and repeated here with the present data set to facilitate comparison.

The first column corresponds to specification 2 that uses total liabilities normalized to GDP as the *de facto* measure of financial integration. The next four columns uses the same specification as specification 2 except for using different classes of financial liabilities that include: (1) Debt liabilities (2) FDI liabilities and (3) FPI liabilities all

normalized to GDP as the *de facto* financial openness measure respectively. The main results from these specifications show that after controlling for time trend, the consumption risk sharing seems to be negligible and an increase in financial liabilities worsens the consumption risk sharing since all the coefficients corresponding to financial openness measure except for FPI liabilities are positive. These measures are statistically insignificant, but the positive coefficient can easily lead to conclude that financial openness has no benefit in terms of *improved* consumption risk sharing.

Contrasting results from the specifications in this section and the threshold specification used in the previous section are very evident. If there are threshold effects of capital market integration on consumption risk sharing, then the linear specification is incorrect and the conclusion that increased integration does not improve consumption risk sharing is also incorrect. Unlike, the linear specification, the results from the last section show that threshold effects are present in terms of financial openness for consumption risk sharing and there is a clear demarcation of three regimes with distinctive extent of consumption risk sharing. The first regime has almost no risk sharing, the second regime shows negative risk sharing while the last regime has better risk sharing capacity. With the exception of FPI, these results hold for all types of liabilities. FPI liabilities in the linear specification also showed some deviant behavior as compared to other forms of liabilities. In the linear specification, FPI seems to improve consumption risk sharing just by the negative sign its coefficient holds (although the estimates are statistically insignificant).

## 3.7 Conclusion

This paper has outlined an empirical strategy for identifying threshold effects of capital market integration on consumption risk-sharing, based on the endogenous threshold identification method in Hansen (1999). Applied to a panel data set of emerging and industrialized economies from 1985 – 2007, a robust qualitative feature of the data is identified. In general, for total capital inflows, FDI inflows and external debt inflows, emerging economies exhibit three regimes. For low levels of integration, consumption risk-sharing is negligible. For high levels of integration, consumption risk-sharing remains imperfect but is statistically and economically significant. However, for intermediate levels of capital inflows, consumption risk-sharing is statistically and economically *negative*. The reason may be that for countries at intermediate levels of integration, capital inflows are pro-cyclical based on investment incentives that are not related to risk-sharing, and this outweigh consumption risk-sharing motives for capital flows. The result appears to be an increase in the volatility of relative consumption growth compared to relative output growth for countries at an intermediate stage of capital market integration.

The general qualitative results of the empirical analysis complement the intuition from the existing literature based on linear specifications (e.g., Kose et al., 2007)or exogenous threshold levels (e.g., Kose et al., 2003). Moreover, the results also suggest that emerging economies may have achieved limited consumption risk-sharing – despite large reductions in capital market barriers – because they have not yet achieved *enough* capital market integration (see also, Kose et al., 2011). The results are starkest for FDI, which seem both the most conducive to consumption risk-sharing beyond an upper critical threshold value, and for which in the intermediate regime consumption risk-sharing is most adversely affected by capital inflows.

CHAPTER 4

# AN EMPIRICAL ANALYSIS OF FOREIGN ASSET ACCUMULATION IN EMERGING ECONOMIES

## 4.1 Introduction

Starting in the 1980's many emerging economies started on a program of financial market reforms to open up domestic capital markets to international capital flows. In the resulting years, emerging market economies have seen a surge in capital inflows due to the higher return opportunities offered in capital scarce economies. This surge of capital has been accompanied by a substantial empirical literature studying factors that affect the level and composition of the liabilities side of the capital account in emerging economies (Fernandez-Arias and Montiel, 1996; Taylor and Sarno, 1997; Chuhan et al., 1998a; Felices and Orskaug, 2008). A noticeable, general trend is that, prior to financial liberalization, capital inflows to emerging markets were mostly in the form of short-term foreign currency-denominated external debt, however after globalization the composition of inflows shifted towards other forms of capital such as FDI and portfolio equity. There is also by now, a substantial empirical literature that studies the implications of the dramatic changes in the liabilities side of the capital accounts, which indicates that the composition of capital inflows has important implications for growth rates, consumption risk-sharing and credit crunch in emerging economies (Haveman et al., 2001; Albuquerque, 2003; Alfaro et al., 2006; Tong and Wei, 2009).

Much less research has focused on the asset side of the capital account in emerging economies. There is a large literature on capital flight (Kant, 1996; Buiter and Szegvari, 2002; Eaton, 1987), i.e., foreign investments motivated primarily by a desire to place assets beyond the control of domestic authorities (Dooley, 1996). But there is a dearth of

research on foreign investments originating in emerging economies and motivated more by standard portfolio considerations. In part this is because foreign investment from emerging economies were both in absolute and relative terms small prior to around the mid 1990s, and also because at first they responded much less to the wave of financial globalization in the late 1980s and early 1990s. But over the past 10-15 years this has started to change as some emerging economies have accumulated substantial foreign asset positions (Bracke et al., 2008).

The most noticeable change has been the large accumulation of foreign exchange (FX) reserves in countries like China, Russia and Venezuela, with big trade surpluses. But there has also been a considerable increase in both foreign direct investment (FDI) and foreign portfolio investments (FPI) from emerging economies. For example, the flow of outward FDI alone for the 37 largest emerging economies reached $133 billion in 2005, which accounted for 17% of world outward flow of FDI, and the estimated value of the stock of FDI investments originating from emerging economies was approximately $1.4 trillion in 2005 (Khan and Khan, 2007). This is a large increase over 1990, when only six of these emerging economies had any non-negligible FDI and the total stock of FDI originating from emerging economies was estimated to be little more than $5 billion (Khan and Khan, 2007). Figure 4.1 illustrates the difference between 1970 and 2007 for the total stocks of FDI, FPI and FX reserves on the asset side of the capital account in 37 emerging economies (numbers reported as % of domestic GDP)[1]. The figure illustrates that the largest change has been in terms of FX reserves, but that FDI and FPI have also increased dramatically over the past 30 years. These numbers are likely to increase as with industrialized countries facing lower growth rates and dealing with

[1]Emerging economies in the sample include: Argentina, Brazil, Chile, China, Colombia, Croatia, Czech Republic, Ecuador, Egypt, Estonia, Hungary, India, Indonesia, Israel, Jordan, Korea, Latvia, Lithuania, Malaysia, Mexico, Morocco, Pakistan, Peru, Philippines, Poland, Portugal, Romania, Russia, Serbia, Singapore, Slovak Republic, Slovenia, South Africa, Thailand, Turkey, Ukraine, Uruguay, Venezuela

budget crisis, the relative importance of capital flows originating in emerging economies is only expected to increase over the next decade. As a result, it is perhaps surprising that there has been relatively little empirical research on factors that determine the level and composition of foreign investments from emerging economies.

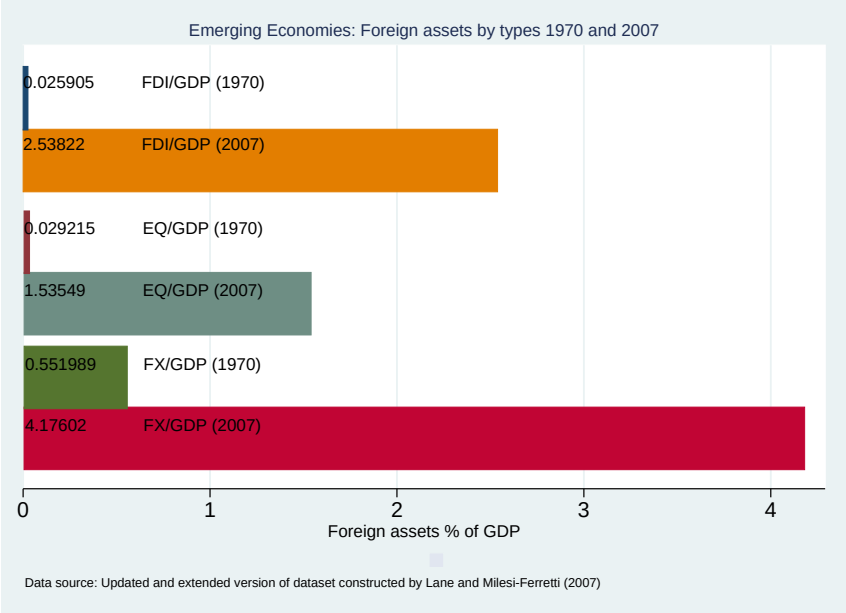



**Figure 4.1:** *Outward capital stocks*

In this paper I study empirically some potential determinants of both cross-sectional and time series variation in the levels and composition of foreign asset holdings in emerging economies, by looking at macroeconomic, institutional, financial and trade variables in a panel data set that covers 37 emerging economies from 1970 to 2007. The total stock of foreign assets held by governments and residents of emerging economies has increased dramatically over this period, in particular over the past 10-15 years. But this general trend disguises considerable heterogeneity, both in terms of the size of the foreign asset position in different emerging economies, as well as the composition of foreign asset holdings in terms of FX reserves, FDI and FPI over time (see, e.g., Figure 4.2 and Figure 4.3). For example, while Chile and Uruguay have similar GDP/capita and on average and have similar trade surpluses, Chile's total stock of foreign assets

is worth approximately 60% of its domestic GDP, while Uruguay's is worth only 20%. South Africa and Turkey have similar GDP/capita and according to most commonly used *de jure* measures are equally open to capital flows, but South Africa's foreign assets were worth almost 40% of domestic GDP in 2004, while Turkey's were worth less than 10% (See Figure 4.4). The Czech Republic and Estonia both held foreign assets worth approximately 30% of domestic GDP in 2005, but in the Czech Republic almost 3/4 of foreign assets were FX reserves, while in Estonia nearly 75% were foreign direct investments or foreign equity holdings. Of course, each of these examples is not a comparison of like for like. Chile, Uruguay, South Africa, Turkey, the Czech Republic and Estonia differ in many dimensions.

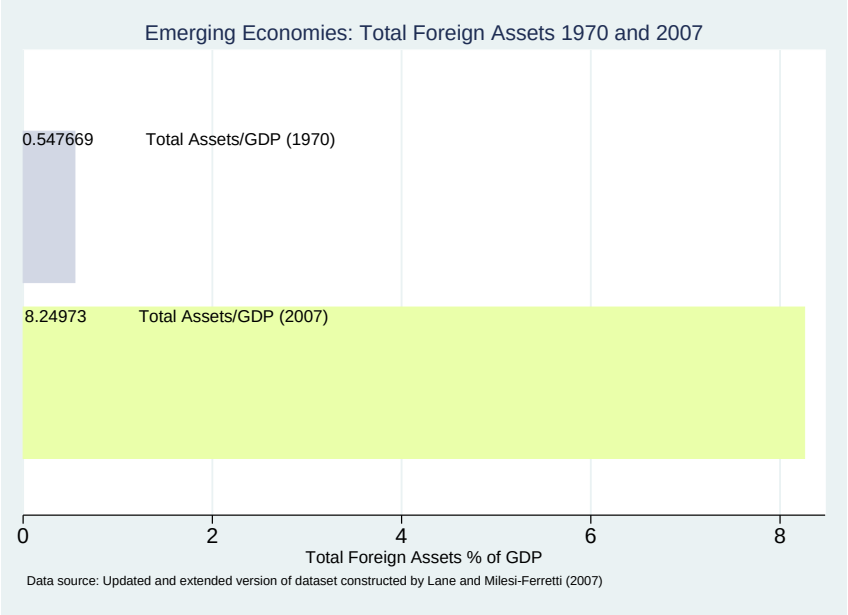



**Figure 4.2:** *Outward capital stocks*

The objective of this paper is therefore to identify potential institutional, macroeconomic or financial differences between emerging economies that can account for differences in the level and compositions of foreign asset positions in emerging economies over time. While an empirical study of determinants of the foreign asset position of emerging economies seems timely and important, any empirical approach faces chal-


**Figure 4.3:** *Outward capital stocks*

lenges. Data quality is a concern for many emerging economies, particularly going back as far as 1970, and endogeneity and missing variables are always problematic when studying relationships between large, macroeconomic or institutional variables (especially for transition economies where macroeconomic outcomes are even more likely to feedback into policy decisions). It is not the intention, therefore, to conduct causal inferences based on the empirical results reported here, but rather to establish some stylized facts – via reduced-form estimation – that can motivate and help to organize further research. The advantage of establishing these results in a panel data analysis is that it allows me to control for latent country-specific fixed effects, that may be difficult to identify explicitly but are likely to be of considerable importance (including, for example, geographic location, natural resources and stable, long-term institutional factors). Of course, there is a large number of variables that may be identified as influencing foreign asset accumulation in emerging economies, and I purposefully take an eclectic

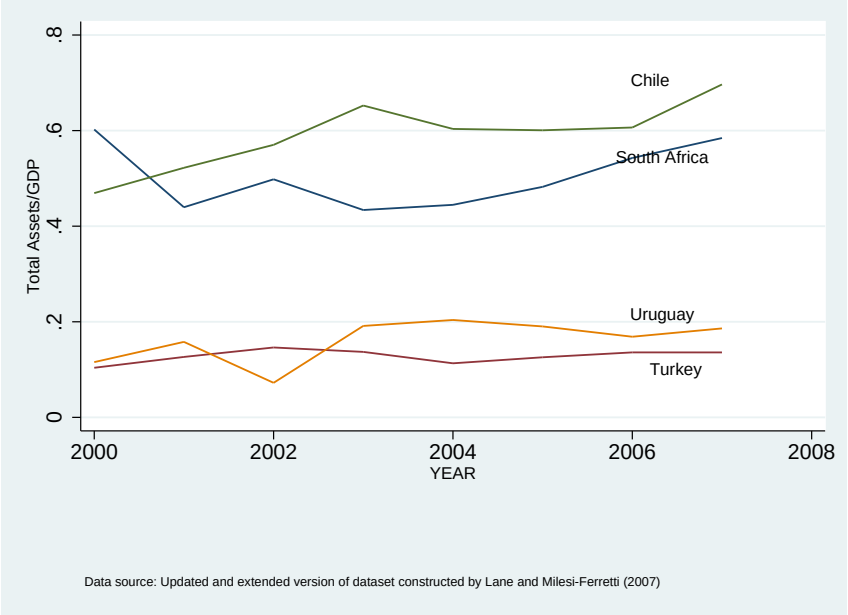



**Figure 4.4:** *Outward capital stocks*

approach in this paper by studying a wide range of potential determinants. The variation in foreign asset positions across emerging economies in the panel is rich, and the empirical results in this paper point to a number of significant correlations with variations in key macroeconomic, institutional and financial variables that seem robust and account for a substantial share of the total variation in foreign asset holdings.

Previewing the empirical results, I find that *de facto* trade openness is statistically and economically the most important factor in explaining panel variation in foreign asset accumulation. Since FX reserves are the largest share of foreign assets, this finding is perhaps not surprising, but trade openness affects FDI and FPI even more than it affects FX which is less expected. External debt to GDP ratios are negatively correlated with all classes of foreign asset holdings, but much more significantly for FPI after 1990 – reflecting in part, perhaps, a change from equity outflows motivated by capital flight towards more stable portfolio considerations in the underlying trend towards increased FPI. Measures of financial depth also correlate positively with all asset classes, but most significantly for FX reserves (complementing earlier findings in Obstfeld et al. (2010)

and Lane and Burke (2001)). Other factors considered have different effects for different asset types. Exchange rate volatility is negatively correlated with FX holdings but positively correlated with FPI (again, suggesting a portfolio incentive for foreign equity investments). Coefficients on indexes of corruption and other fundamental institutional variables are generally insignificant, except in regressions for FX alone (and are then negative but economically small), and crisis events (currency/financial/debt crisis) are also insignificant except in the case of FX reserves. This affirms the received wisdom that FX reserves are accumulated in part to act as a buffer against crises events, and indicates why determinant of FX reserves perhaps differ from determinants for FDI and FPI more generally. *De jure* measure of capital openness are, perhaps surprisingly, insignificant for FX holdings but has positive significant effect on FDI and total assets while negative effect for FPI. Exchange rate regime is only significant for FDI assets. I provide more detailed discussions of these findings and possible interpretations, as well as details about other control variables included in regressions, in Section 4.2.3 of the paper.

### 4.1.1 Related literature

The directly related literature is small. Until recently, the empirical literature on international finance with respect to emerging economies can be described as a confluence of debates surrounding the benefits and costs associated with financial liabilities and their structure, as well as the negative impact of capital flight or sudden capital stops in emerging economies. The empirical literature that looks at long-term trends in the asset side of the capital account in emerging economies is, by comparison, sparse. Whatever little is available is generally focused on the very large increase in FX reserves in emerging economies over the past decade, or based on certain country case studies, with a few

notable exceptions.

Of the papers looking at determinants of FX reserves, the two that are most closely related to the present study are Lane and Burke (2001) and Obstfeld et al. (2010). Both present results of reduced-form estimation for factors that affect FX reserves specifically in emerging economies. Lane and Burke (2001) include many of the variables I study in this paper, but with a focus only on FX reserves and looking only at cross-sectional variation. They use data only for the 14 year time period from 1981-1995 and focus on cross-sectional variation in order to abstract from cyclical fluctuations in reserves. They also argue that this is less restrictive than it seems because there is little time variation in their regressors. However, I include a number of additional regressors, such as external debt to GDP, for which there is huge variation over time and also want to control for country fixed affects that seem important when looking at foreign asset positions. I therefore use both the cross-sectional and time series variation in the panel, and try to mitigate for potential cyclical affects by viewing a longer time horizon (1970-2007), and using various techniques to control for crisis events.

Obstfeld et al. (2010) also exploit both cross-sectional and time series variation in a panel data set covering 1980-2004 to study the determinants of the growing FX reserves in emerging economies. They find that the size of domestic financial liabilities that could potentially be converted into foreign currency (M2), financial openness that improves the ability to access foreign currency through debt markets, and exchange rate policy are significant predictors for accumulation of FX reserves. My analysis corroborates these findings when restricted to FX reserves, but also identifies differences between determinants of the variation in FX reserves and other classes of foreign assets. Moreover, Obstfeld et al. (2010) find that external debt levels have no significant affect on FX reserves but only report regressions without country fixed effects. Since

geography, natural resources, language, form of government, etc., are all potentially important sources of fixed effects, I control for fixed effects in my regressions. Hausman tests confirm the importance of fixed effects in all regressions. When fixed effects are omitted, I also find no significant effect of external debt levels on FX reserves in the larger data set I use, although I do find that external debt is significant for FDI, FPI, and marginally significant for the total stock of foreign assets. Moreover, when fixed effects are included external debt significantly effects (both in a statistical and economic sense) the level of all types of foreign assets. With the exception of including country fixed effects, my basic methodology is very similar to Obstfeld et al. (2010), but I take in a larger set of regressors with data covering a larger time horizon, and also study FDI and FPI stocks as well as the total stock of all foreign assets.

The only other empirical paper of which I am aware studies determinants of FDI or FPI originating in emerging economies and which is also motivated by portfolio considerations is Giovanni (2005). This paper studies panel data on cross border mergers and acquisitions to investigate whether macroeconomic and financial factors affect firm's decisions to make foreign direct investments abroad. Their approach is based on a gravity model – which is commonly used in the trade literature – and they study how different institutional and financial variables affect bilateral M&A activity, including some emerging economies in their sample. Their main finding is that the depth of domestic financial markets is a significant factor for foreign direct investments. Their data is uniquely suited to the study of cross-border M&A activity and can not be extended further to look at other types of foreign asset positions because of current data limitations. The empirical analysis in this paper, is less deep but has substantially wider scope, taking in a broader time period, set of countries, types of assets, and factors that correlate with the level and composition of foreign investments with a focus on emerging economies.

Finally, there is some discussion relating capital outflows from emerging economies in terms of capital flight in the literature. In particular Dooley (1988) and Schneider (2003) attempt to distinguish between the normal capital outflows and capital flight. The former study highlights that capital flight is determined by the relative perception of risks that residents and non-residents in holding claims on the residents of the countries while the conventional determinants such as yield differential between countries do not motivate capital flight. The later study highlights that interpreting the capital outflows to be motivated by investors reluctance in investing in their domestic economy due to political or economic instability can be misleading since more recently, with financial integration, investors behavior in non-industrial countries can also be motivated by other factors such as diversification or better yield. Collier et al. (1999) also use data for 51 countries to study the heterogeneity amongst countries in terms of the amount of capital flight, motivated in particular by the stark difference between South Africa's holdings of foreign assets, that are worth 39% of the total wealth, and Esat Asia's holdings of foreign assets, that are estimated to be 3% of the total wealth. The study highlights that the difference in the amount of capital flight can be attributed to high indebtedness, adverse investors risk ratings and exchange rate overvaluation. However, as Schneider (2003) documents, such analysis starts from the often misleading premise that all capital outflows are capital flight. The findings in this paper, that external debt/GDP is significantly negatively correlated with all classes of foreign assets, suggests that much of the more recent capital outflow from emerging economies is rather based on more stable portfolio considerations.

In the next section I discuss the data set and basic empirical methodology. In Section 4.3 I present the results for basic regressions, interpret some of the starker and more stable findings, and discuss a number of the robustness checks performed. Section 4.4.1 provides an instrument variable approach for the analysis. Section 4.5 concludes. The

Appendix C contains additional discussion of the data set, summary statistics and results for some of the robustness checks and Appendix E presents comparison of the results with advanced economies.

## 4.2 Data and Methodology

### 4.2.1 Data description

I use an unbalanced panel covering 37 emerging economies from 1970-2007 compiled from various sources. The full list of countries covered in the sample and the time coverage for each country are listed in Table 4.1. I follow the IMF classification of emerging markets to include only countries with per capita income above US $1000 and below US $15,000 in 2010 (at market exchange rates). The list changes only marginally when one uses purchasing power parity-adjusted exchange rates and an income threshold of about $18,000 in 2010. With the latter classification only Hungary and Poland would then be classified as advanced, but I include them in general because it does not change the quantitative results much. The IMF classifies Hong Kong, Israel, Korea and Singapore as "more developed emerging economies" (on the verge of industrial economy status). I include these countries in the primary regressions. Results are robust to their omission. The data sources for each variable are listed in Table 3.1 in the Appendix C. Descriptive statistics for all variables are also provided in the Appendix C.

**Table 4.1:** *Country and Time Period*

| Country | Time Period | Country | Time Period |
|---|---|---|---|
| Argentina | 1970-2007 | Brazil | 1970-2007 |
| Chile | 1970-2007 | China | 1984-2007 |
| Colombia | 1970-2007 | Croatia | 1996-2007 |
| Czech Republic | 1996-2007 | Ecuador | 1970-2007 |
| Egypt | 1970-2007 | Estonia | 1992-2007 |
| Hungary | 1987-2007 | India | 1970-2007 |
| Indonesia | 1979-2007 | Israel | 1970-2007 |
| Jordan | 1970-2007 | Korea | 1971-2006 |
| Latvia | 1993-2007 | Lithuania | 1994-2007 |
| Malaysia | 1970-2007 | Mexico | 1970-2007 |
| Morocco | 1970-2007 | Pakistan | 1970-2007 |
| Peru | 1970-2007 | Philippines | 1970-2007 |
| Poland | 1986-2007 | Portugal | 1970-2007 |
| Romania | 1990-2007 | Russia | 1993-2007 |
| Serbia | 1995-2007 | Singapore | 1970-2007 |
| Slovak Republic | 1993-2007 | Slovenia | 1992-2007 |
| South Africa | 1970-2007 | Thailand | 1970-2007 |
| Turkey | 1970-2007 | Ukraine | 1994-2007 |
| Uruguay | 1970-2007 | Venezuela | 1970-2007 |

### 4.2.2 Methodology

I study the determinants of the variation in different classes of foreign assets controlling for country fixed effects and common time trends, and perform robustness checks including also time fixed effects.[2]Detrending to remove common time trends and time fixed effects remove time trends, but since time trends themselves are also of interest, I report results without detrending or time fixed effects in the Appendix D. Results with

[2]Common time trend may also lead to spurious conclusions in the preceeding analysis, therefore I use a simple methodology to detrend the series of the data. In this way, all the variation in the series that can be explained by time is cotrolled for. I then use predicted values so that the difference between predicted values of the variable and the actual values of the variable results into a detrended series. Regression equation for detrending is as follows:

$$y = \alpha_0 + \beta_1(t) \tag{4.1}$$

Using the estimated coefficients, predicted values of the variable $y_{it}$, denoted by $\hat{y_{it}}$ are calculated which is then used to remove the time trend from the series as shown below:

$$y - \hat{y} = \hat{\epsilon} \tag{4.2}$$

This resulting residual series are now independent of time trend.

time fixed effects are generally qualitatively similar, although the quantitative effects are smaller. I also run random fixed effects, but *Hausman test* favors the fixed effect model and therefore only fixed effect results are provided in the paper. Pooled OLS regressions are also done for comparison, but this methodology is inadequate mainly because the countries in the sample are so diverse and the time trends are so strong, that ignoring the panel structure is highly inefficient. The main regression equations are of the following form.

$$\log(Y_{it}) = \alpha + \beta IF_{it}^{'} + \gamma MF_{it}^{'} + \kappa TF_{it}^{'} + \chi FF_{it}^{'} + \mu_i \tag{4.3}$$

where $i = 1, ....., I$ represent individual countries and $t = 1, ....., T$ represent time periods.

**Regressands**

I look at 4 different dependent variables $Y_i t$, representing different broad classes of foreign asset stocks normalized by domestic GDP, and logged to facilitate interpretation. The log specification is intended to reduce the role of the countries with very high asset to GDP ratios. However, levels specification also have very similar qualitative results with large correlation coefficients.

$$Y_{it} = \begin{cases} \frac{FDI_{it}}{GDP_{it}} \\ \frac{FPI_{it}}{GDP_{it}} \\ \frac{FX_{it}}{GDP_{it}} \\ \frac{(FDI_{it}+FPI_{it}+FX_{it})}{GDP_{it}}, \end{cases}$$

Although the classification into FDI, FPI and FX reserves is quite broad, it is well-defined enough to allow access to reasonable data. There are also important differences between these asset classes. Viewed as an asset, FX reserves are more passive in the sense that they have more precautionary saving motives. One motivation posited for the large accumulation of FX reserves in emerging economies over the past 10-15 years has been to build a buffer stock to insulate and protect domestic economies against macroeconomic crisis. But FDI and FPI are more active, requiring greater risk-management and allocation considerations. Both FDI and FPI can be motivated by capital flight – foreign investments to bring savings and investments out of the purview of domestic authorities – or portfolio considerations – foreign investments to pursue higher returns or hedge against country-specific shocks and sources of volatility.

Moreover, within the class of active assets, FDI and FPI can be differentiated in terms of control and liquidity. To be classified as FDI, foreign investments must involve a considerable stake in a foreign business activity, while FPI generally involve much less direct control of foreign business activities. FDI also tend to span longer time horizons, often being much less liquid and therefore involving more stable business partnerships across international borders. On the other hand, foreign equity holdings are generally easy to shuffle between companies and countries and therefore have more of a "hot money" characteristic. Foreign equity portfolios can often be re-aligned and adjusted quickly, and are perhaps more sensitive therefore to short-term sources of volatility and uncertainty.

### 4.2.3 Regressors

In terms of potential regressors that can be related to variation in the level and composition of foreign asset holdings, I take an eclectic approach and consider numerous domestic factors for which there is reasonable data and for which there are strong priors of possible correlations. It must be noted that the firm theoretical priors are sparse and therefore, this analysis is intended to be an explanatory exercise. The potential determinants considered are diverse but for expositional purposes I divide them into 4 broad categories: (1) macroeconomic variables ($MF_{it}$), (2) institutional variables ($IF_{it}$ ), (3) financial variables ($FF_{it}$), and (4) trade variables ($TF_{it}$). All regressors are also transformed relative to domestic GDP and logged, so that coefficients can be interpreted as elasticities (subject to the caveat over making causal inferences based on relationships between large, macroeconomic and institutional variables), with the exception of dummies and categorical variables. The full list of variables included in regressions is provided in Table 4.2 below.[3]

Before presenting the results, I provide some motivation for the choice of regressors and indicate possible priors over expected signs for correlations.

#### Institutional factors

Stable institutional factors, such as form of government or legal systems, that in many cases are largely time-invariant will be controlled for by country fixed effects. However, there are also institutional factors and government policies that changed dramatically for some emerging economies over the sample time period. Examples include the degree of capital market openness, corruption levels, political instability or exchange rate regimes.

[3]Other controls that were not significant and did not affect qualitative results are omitted in the leading regressions reported, but are summarized in the Appendix C - Appendix F.

**Table 4.2:** *Factors*

| Factors | |
|---|---|
| | |
| Institutional Factors | Financial Openness<br>Exchange Rate Regime<br>Corruption |
| Macroeconomic Factors | General Development<br>Exchange Rate Volatility<br>Short term External Debt |
| Trade Factors | Current Account Surplus<br>Trade Openness |
| Financial Factors | Financial Depth |

*Capital openness:* A reasonable prior would be that greater capital openness promotes foreign asset accumulation, especially FDI and FPI. One general difficulty is both, to define reasonable measures of capital openness and to distinguish clearly between measures that prevent inwards vs. outward investment.[4] I focus on the measure of capital openness proposed by Chinn and Ito (Chinn and Ito, 2008), but find similar results with other common measures from the literature. The Chinn-Ito measure focuses as much on capital inflows as outflows, but since the sale of domestic assets is also a source of financing for the purchase of foreign assets, restrictions on inward capital flows could also potentially be important for the size and composition of foreign asset holdings.

*Exchange rate regime:* A central difference between emerging economies and industrial economies has been in terms of exchange rate regimes. Since the collapse of

[4]See for example (Edison and Warnock, 2003; Edwards, 2001; Edison et al., 2002) for discussions and comparisons of various measures on capital restrictions. For extensive reviews on capital controls policy or financial liberalization refer to (Dooley, 1996; Kose et al., 2006; Henry, 2007). In particular, for capital controls relating capital inflows and outflows refer to (Edwards, 1999).

Bretton-Woods, industrialized economies have generally had flexible exchange rates (the important exception being monetary integration within the EU). In emerging economies, on the other hand, exchange rate regimes remain largely at least managed in some way. Managed exchange rates decrease incentives for foreign investment to hedge against exchange rate risks, but they also potentially decrease volatility of domestic consumption value of returns on foreign assets. *A prior* it is therefore, not clear what the correlation between measures of exchange rate rigidity and FDI and FPI investments should be. In addition, managing exchange rates can both increase incentives for FX reserve accumulation in order to hold pegs. I study the effects of exchange rate regimes on foreign assets in emerging economies by including a categorical variable taking values from 1-4, 1 representing a fixed exchange rate and 4 a flexible exchange rate with degrees of rigidity captured by 2 and 3. A fine exchange rate indicator taking values from 1-14 is also considered, but this did not provide any additional insights.

*Political Stability:* Political stability may also affect incentives for foreign asset accumulation. On one hand, greater corruption or political instability can reduce capital inflows due to reappropriation concerns by foreign investors, and this has the potential to reduce foreign asset accumulation on an income risk-sharing motive. On the other hand, political instability and corruption may precipitate capital flight, and a positive coefficient on measures of corruption or political instability could therefore provide some stylized evidence of continuing fear that bad governance will not be able to provide a conducive environment for safe savings and profitable investments Alesina and Tabellini (1989). Measures of the quality of domestic governance, for which there is noticeable cross-sectional and time series variation, are therefore potentially important factors in determining foreign asset accumulation and it is not *a priori* clear what expected sign should be. In the leading results, I include only a general measure of quality of governance and anti-corruption efforts provided by the World Bank, because regressions with

other measures of political instability lead to similar conclusions.

### Macroeconomic factors

Several literatures now exist that investigates the relation between macroeconomic variables and capital inflows.[5] However, this paper is a primer for future analysis focusing on the *asset* side of the capital account in emerging economies, but I include similar domestic variables as the ones used in the literature on liabilities to facilitate comparison. Important amongst these are GDP per capita as a measure of general development, total external debt to GDP ratio as a potential measure of the sustainability of foreign debt positions, and exchange rate volatility.

*GDP per capita:* GDP per capita encompasses the overall level of general development of a country. Countries that have higher GDP per capita may have less scarcity of capital and will therefore provide more incentive to pursue foreign investment both because of higher potential savings and lower return differentials. Including GDP/capita is therefore a way to control for the general progress of the country and one would expect that it correlates positively with foreign asset accumulation.

*External debt to GDP ratio:* Total external debt is the total debt stock of the country that is denominated in external currency and therefore represents both the principal and interest on liabilities that must be repaid in foreign currency. The ratio of external debt to GDP captures the sustainability of the economy's total debt profile with respect to foreign lenders. Total external debt to GDP is composed of short term external debt to GDP and long term external debt to GDP. The fraction of total external debt to GDP composing of short term external debt to GDP is an indication of whether the country

[5]Some of the examples of empirical work relating push and pull factors of capital inflows includes (Montiel and Reinhart, 1999; Reinhart et al., 1993; Chuhan et al., 1998b; Fernandez-Arias and DEC, 1994; Dooley et al., 1994; Bennett et al., 1993; Hernandez and Rudolph, 1994).

has the ability to repay its debt obligations that are due in near future and is therefore generally regarded as a good indicator of sovereign default risk.[6] In addition, the data for long-term debt liabilities is too scarce, I focus on short-term external debt for which data is more widely available.

To understand the motivation behind adding external debt ratios in the analysis, it is important to revisit the distinction between capital flight and normal capital outflows. In some sense, it has been argued that the difference between capital flight and normal capital outflows is same as the difference between bank runs and the normal withdrawals from the bank (McLeod, 1993). Capital flight are therefore outflow that are often sudden and matches with the incidence of crisis situations. High external debt/GDP ratios are viewed as good indicators of potential debt crisis (Reinhart and Rogoff, 2011) and may therefore correlate positively with foreign asset accumulation. On the other hand, as recently argued by Bai and Zhang (2012) and Malik (2011), external debt/GDP can reduce incentives for foreign investment out of diversification incentives.[7] When the primary motive for foreign investment is basic portfolio considerations, it is quite possible that external debt/GDP could correlate negatively with foreign asset accumulation. Again, it is therefore of interest to include debt/GDP ratios to try to determine if any stylized facts in support of either conclusion emerge.

*Exchange rate volatility:* Investors not only care about exchange rates *per se* but also about volatility associated with exchange rates. Both empirical and theoretical literature on the implications of exchange rate uncertainty and volatility on foreign investment, and especially on foreign direct investments, even in better studied industrial economies, is far from certain. Aizenman (1992) theoretically shows that exchange rate volatility re-

[6]Short term external debt is external debt that has a maturity of less than 1 year and therefore sustaining this type of debt is better in capturing sovereign default risk.

[7]Bai and Zhang (2012) uses (*ex-post*) borrowing and lending channel for risk sharing while Malik (2011) uses (*ex-ante*) foreign asset holdings for diversification purposes. Using two distinct channels for risk sharing, both papers explain why there exist limited risk sharing in emerging economies.

sults in decrease in foreign direct investments if the underlying shock is nominal. Darby et al. (1998) and Sung and Lapan (2000) show the opposite result. Empirically, Froot and Stein (1991) show that foreign acquisition of US firms increased after exchange rate depreciation of 1985. Also, Esquivel and Larrain (2002) show two channels through which exchange rate volatility and FDI can be linked. One of the two channels is that as long as the expected returns are high enough to cover the currency risk, investors will find it beneficial investing in foreign countries. Therefore, higher exchange rate volatility can imply increase in foreign direct investments. Unlike many other literatures that show no significant effect of exchange rate uncertainty on real activity, Aghion et al. (2006) show that negative investment effects of domestic credit constraint exacerbate in the presence of exchange rate uncertainty. Moreover, specifically for FPI, Fidora et al. (2006) find that greater real exchange rate volatility increases home-bias in bonds and equities, a finding they attribute to the fact that exchange rate volatility can put additional risk on holding foreign securities from a domestic (currency) investors' point of view. However, this is not necessarily true if foreign local currency real returns and the real exchange rate are sufficiently negatively correlated. Finally, the affect of exchange rate volatility on FX reserves is studied in Obstfeld et al. (2010), and they report that exchange rate volatility does not have significant affect on reserve accumulation. Endogeneity is a concern which Obstfeld et al. (2010) also point out, because FX reserves can decrease the exchange rate volatility with a managed exchange rate so that causality might not be straight forward. However, they still include exchange rate volatility in their regressions, and I also include exchange rate volatility here to see if support emerges for any of the aforementioned theories when attention is restricted to emerging economies, and also to see whether exchange rate volatility has differential affects on different types of foreign investments.

**Financial factors**

The role of financial development has received considerable attention in the literature on economic growth, financial stability and international financial integration in industrialized as well as emerging economies in recent years. Over the time period 1970-2007, there has been considerable variation in emerging economies in terms of financial depth of domestic capital markets, i.e., the ease of access to capital necessary for households, firms and governments to undertake investment projects which they might otherwise be unable to take advantage of. Many theoretical models in the literature have considered the prominent role played by financial depth which is captured through ratio of broad money or size to show effects on growth, financial stability, accumulation of domestic foreign assets and international financial integration. Some examples are (Velasco, 1987; Calvo, 1996; Chang and Velasco, 2001). Unlike most literature that focuses on capital inflows, Giovanni (2005) specifically look at what macroeconomic and financial factors, especially financial deepening, affect the acquisition of FDIs. Rodrik (2006) also argues that at least for reserve accumulation, emerging markets that has begun to embark on financial liberalization starting in the early 1990s, is empirically driven by the size of the domestic financial sector rather than by real magnitudes such as trade flows. Obstfeld et al. (2010) and Lane and Burke (2001) also find that financial depth, measured by M2 over GDP is a significant factor in FX reserve accumulation in both industrialized and emerging economies. I therefore include M2/GDP as a regressor, to also study how financial deepening affects capital outflows more generally and to study how it correlates with panel variation in FDI, FPI and FX reserves. The prior is that financial depth should be significantly positively correlated with foreign assets.

**Trade factors**

On the issue of sequencing, Chinn and Ito (2008) find that trade openness precedes capital account liberalization while banking system development is a precondition for equity market development. Similarly, trade balance is one of the major factors of country's financial and economic interaction with the rest of the world. Therefore, as in the existing literature on financial flows and trade, I also take into account trade openness measures. There are different alternative ways to do this, but I choose to concentrate on *de facto* measures of trade openness, the most commonly used of which is simply the sum of total exports plus imports normalized by domestic GDP. One general concern that afflicts this measure, as well as others, is that financial flows and trade can have a two way linkage which poses problems regarding endogeniety (see for eg., (Aizenman and Noy, 2005)). As result, I lag the trade variable by one period and also consider rolling windows on past trade. This does reduce correlation between regressors and residuals (which are anyway not particularly at less than 0.05), but does not seem to affect quantitative estimates of regression coefficients much. It is nevertheless important again to be cautious about making causal inferences and probably safer to interpret the results as indicative of stylized correlations subject to controls on other variables. A strong prior would be that trade should be significantly positively correlated with all classes of foreign assets.

*Current account surplus:* One reason why trade openness may be important for foreign asset accumulation, in particular FX reserves, is that current account surpluses can be the source of financing for foreign asset purchases. Current account surplus would therefore be another potential regressors to include, with a prior for a significant positive correlation. However, the *de facto* measure of trade openness discussed above and widely used in the literature is highly correlated with the current account surplus and it is therefore not possible to include both. I therefore run regressions with both possible

measures of trade outcomes, but report only the results for trade openness. The affect on other coefficient of using current account is small, but while trade openness is itself highly significant in nearly all regressions, the current account perhaps surprisingly is not. However, with regards to other variables the results are exceptionally close.

### 4.2.4 Estimation method

Including a selection of the aforementioned regressors, I use country fixed effects methods for estimating coefficients for each class of assets (FDI, FPI and FX reserves), as well as the total foreign asset position. All regressors reported are robust to heterogeneity and first and second order autocorrelation. Including time fixed effects reduces the magnitude of estimates considerably because it removes important time trends from the data. I therefore focus on country fixed effects only. However, there is some reason to believe that there may be important structural changes around the beginning of the 1990s due to the general wave of financial globalization at this time, and the collapse of the Soviet Union which dramatically altered the economic institutions in particular of the eastern European states in the sample. As a result, I also report results which include a post 1990 dummy as well as interaction terms with this dummy.

## 4.3 Results

In this section, I present results of the regression analysis, first for total foreign asset holdings, then individually for FX reserves, FDI and FPI. I look at how each asset class is influenced by the full battery of macroeconomic, institutional, trade and financial factors discussed in the previous Section 4.2.3 in the full sample period 1970-2007. The

disintegration into different asset classes helps in analyzing if any specific factor is more important for a particular type of foreign asset, a feature may be masked by the analysis based on total asset holdings. I also report some results for regressions on the subsample from 1990 - 2007, or with regressions on the full sample but with a post 1990 dummy and interaction terms. The results for the time subsample are similar, but point to some possible structural changes around 1990, at time around which many financial market reforms were enacted in emerging economies and also a time of profound change for the eastern European economies in the sample.

### 4.3.1 Total Foreign Assets

Table C.4 gives results for the robust regression of detrended total foreign assets on various macroeconomic, institutional, financial and trade variables for the full sample period 1970-2007. The coefficients on short-term external debt, exchange rate volatility, the World Bank anti-corruption measure and a dummy for crisis event dates are significant and negative; the coefficients on the ratio M2/GDP, which is a commonly used measure of financial depth, and the *de facto* measure of trade openness are significant and positive; and the within $R^2$ of 0.25 indicates that these factors explain almost 25% of the total within panel variation in total foreign assets in emerging economies.

These results indicate that short-term external debt (external debt with a maturity of less than 1 year), seems detrimental to the total foreign assets accumulated by emerging economies. Based on a capital flight scenario, higher debt might serve as a signal for future tax increases and therefore increase incentives to move capital out of country. The results suggests that this mechanism is either not at play or dominated by other forces. One should caution that future tax increases may be just as likely to result from

long-term debt obligations for which there is not sufficient data to estimate regression coefficients. However, there are also reasons to believe that higher external debt positions can reduce incentives for diversification through foreign investments. Short-term debt/GDP is a common measure of default risk on external debt obligations, and as I demonstrate in Malik (2011), there is a general trade-off between the option value that accrues on default options domestically and the benefits of foreign investment for risk-sharing purposes. Bai and Zhang (2012) point out a similar relationship between external debt positions and foreign investment, though with a very different mechanisms. This implies that in emerging economies decisions relating international interactions have relations to sovereignty and hence default penalties of the country. The results of Table C.4 therefore lend some stylized support to these two recent theoretical studies of the relationship between external debt positions and foreign investment from emerging economies.

The coefficients on exchange rate volatility and anti-corruption both have the expected signs as discussed in Section 4.2.3. When exchange rate volatility increases, this implies that emerging economies have less incentives to accumulate assets since the value of these assets also becomes more volatile. This uncertainty in the value can deter investors from using foreign assets for higher returns or diversification purposes. However, economically speaking the results are small, compared to the other regression coefficients. Whereas, anti-corruption variable reflects the legal system and/or fulfilling contracts which shows that as anti-corruption increases less of the assets are accumulated. This variable captures any flow out of the country for the reason of bad economic environment and in a crude sense also controls for capital flight.

The crisis date is important to take into account the sudden changes in the flows of capital due to crisis in the economy. These crisis dates should capture a reduction in

assets accumulation since in such times, many economies resort to liquefy their assets abroad to either oblige their debts or to have more liquidity in the time of need or just use reserves which are highly liquid to respond to the critical situation as a short term fix. As a result, the negative coefficient on crisis date should not be unexpected and likely reflects a run down of assets during financial, currency or default crisis.

The result with regards to financial deepness and trade openness are both significantly positively correlated with total foreign asset accumulation. The former is measure of general development of the financial system that harnesses the better allocation of capital keeping in mind both higher returns and diversification issues while the later is often a pre-requirement for the economy to involve in financial asset trade. The single biggest factor is trade openness. Due to possible concerns over endogeneity this result should be interpreted with caution, but it is clearly too significant to ignore. Variation in trade openness alone would already account for almost 40% of the total within panel variation of total foreign assets. A high correlation between the regressor and residuals for the regression that includes only country-fixed effects and trade-openess is indicative of the potential endogeneity problem, but this correlation reduces considerably (from approximately 0.6 to approximately 0.1) when the other regressors are included suggesting that missing variables could be part of the problem. Moreover, $f$-tests reveal that any collection of regressors in Table C.4 is also significant (under the standard normality assumptions). However, trade-openess remains even when all regressors are included economically the single most important determinant of foreign asset accumulation.

The results based on the total foreign assets, mask possible the differences between key determinants of the variation between different types of assets. In particular, since foreign exchange reserves are considerably larger overall than FDI and FPI, determinants of FX reserves can overwhelm others. Tables C.5 - C.7 therefore present results

for separate regressions for each class of foreign assets. The results for FX reserves are similar to the results found in Obstfeld et al. (2010), with the important exception that I find a significant negative relationship between FX reserves and external-debt. This is in part because they do not present results for the relationship between FX reserves and external debt/GDP for country fixed effects regressions, where there specification does in fact also indicate a significant negative relationship. In discussing other results, I focus on regression coefficients that differ between different asset types.

### 4.3.2 Foreign exchange reserves

The results for foreign exchange reserves are similar (both qualitatively and quantitatively) to the results based on the total foreign assets. The main reason for such similarity is that foreign exchange reserves account for most of the assets for some emerging economies. In general, the results support the received wisdom (see, e.g., (Pineau and Dorrucci, 2006)) that emerging economies have accumulated foreign exchange reserves in recent years to use for self-insurance against possibly externally originating crisis. Noticeably, the crisis date dummy is particularly significant for FX reserves, suggesting that reserves often serve as a cushion against possible external crisis. Note that for FDI and FPI, crisis date are both insignificant, and most of the significance in the total foreign asset regression from Table C.4 therefore comes from the affect that crisis events have on FX reserves.

### 4.3.3 Foreign direct investments

The results are similar as for total foreign assets but three important differences are evident. Firstly, FDI are also negatively influenced by short term debt. The associated sign is negative for all the specifications however, it is only significant for specification 3. However, these results must be interpreted with caution since endogeniety issues or removing of the trend can plague the results. These results, however, are inline with both Malik (2011) and Bai and Zhang (2012), which establish a theoretical basis for the negative correlation between external debt/GDP and foreign assets and are based on planner's problems for a small open economy in which foreign investment is motivated by an active risk-sharing incentive. They, therefore speak most strongly to FDI assets, especially since it is a peculiarity of emerging economies that authorities in most emerging economies have considerable influence on foreign direct investment through state-owned enterprises and sovereign wealth funds. The results for the regressions for FDI therefore indicate that the effect of external debt on foreign assets is strongest where it would be expected to be strongest, in the asset class where have to deal directly with the trade-off between sovereign default options and international risk-sharing incentives.

Secondly, unlike total assets, FDI is negatively influenced by capital openness. This is in contrast to the theoretical predictions which is that financial openness should improve capital mobility and in the case of FDI assets. However, as discussed in the previous Section 4.2.3, Chinn and Ito (2008) show that trade openness precedes capital openness. It could therefore be argued that the trade-openness coefficient already captures most of the influence of capital openness on financial assets.

Third, FDI is positively influenced by the flexibility of the exchange rate regime. This is in contrast to foreign exchange reserves. As exchange rate regime becomes more flexible, the asset owned in the form of FDI are positively influenced. Two different

specification for exchange rate regimes have been used and the results are quantitatively and qualitatively very similar. The only difference with a fine classification of exchange rate regime is that the magnitude of exchange rate regime falls. The reason is that fine classification is spanned between 0-14 while coarse classification is based on 0-4 scale. The results listed below are based on coarse classification since the changes in regime do not occur that often in the sample and if some crisis event occurs, the regime change is much more drastic and hence captured well by the coarse scale. According to the results listed below, there is a positive correlation. Higher exchange rates regime implies moving from pegged to the floating regimes. Floating regimes seems to help the building of such types of foreign assets. One reasoning can be as provided by Ghosh et al. (2003) which is that there is a strong relation between fixed exchange rates and low inflation. This is partly due to "a discipline effect" (the political costs of abandoning the peg induce tighter policies) and a "confidence effect" (greater confidence leads to a greater willingness to hold domestic currency rather than foreign currencies and assets). This implies that a floating exchange rate can affect the confidence of the investors and they might explore other option for investing in foreign economy. However, if everything else if equal, then FDI abroad can lead to better risk sharing mechanisms for the country.[8]

### 4.3.4 Equity portfolio

The results for FPI differ notably from the results for FX reserves and FDI. This in itself is interesting. Since FPI and FDI represent the two active asset types, a reasonable prior would have been that they should behave in a similar manner. However, equity portfolio is, for example, not significantly affected by short term debt which is a statistically and economically significant variable in terms of the variation in both FX reserves and FDI.

[8] Exchange rate regime is robust to another specification that uses current account surplus in place of trade openness.

Moreover, the sign on the coefficient for exchange rate volatility is the opposite compared to FX reserves and FDI. Both results suggest that the more important distinction than between active and passive assets, is a distinction based on the time horizon. FPI is an assortment or range of investments in foreign securities, or other types of investment vehicles, motivated usually to spread risk of possible loss due to below expectation performance of one or few of the investors. The flexibility attached to the equity or portfolio investment makes it more liquid than other forms of assets. It may be the motivation to hedge against more short term risks, such as foreign currency risks, that leads to the different results obtained for FPI than the other asset classes.

Exchange rate volatility also seems to be positively correlated to FPI assets. Again, these types of assets by conception are accumulated when domestically the exchange rate volatility poses threat to the stability of the currency. Holding equity in other stable currency can help lower such risks. Since these types of assets are non-binding to the system in which they are invested and can be shifted easily between securities, capital tend to flow out to accumulate this type of assets and such an outflow may have capital flight issues. The interpretation of exchange rate volatility and equity investments can become tricky when another facet of explanation is regarded. If we assume that investors only invest abroad for the purpose of diversification, this would entail that they seek to make use of returns on foreign assets that are less correlated or ideally negatively correlated to the return on domestic assets and then the presence of high exchange rate volatility would provide an incentive to use foreign equity investment as an opportunity. This line of explanation is based on the assumption that investors undertake foreign investments to diversify their risk and it is consistent with Fidora et al. (2006).

### 4.3.5 After 1990

Finally, I report results in Table C.4-C.7, column 2 for all asset types but restricted to the sample period 1990-2007, and in Table C.4-C.7, column 3-4 for all asset classes over the full sample period 1970-2007, but including a time dummy that takes value 1 only after 1990, as well as several interaction terms with this time dummy. The first set of results is reported primarily to indicate that results for the full sample are not driven by pre-1990 dynamics, but mostly derive from variation in foreign assets after the advent of financial globalization. Note that, indeed both qualitative and quantitative results for the regression restricted to post-1990 are similar to the results for the full sample period, except that some of the economically less important coefficients are now also statistically insignificant, a reflection perhaps of the the substantial reduction in the number of observations.

The results including the time dummy are included to indicate possible structural changes that could have occurred after the globalization era. The time dummy itself is sometimes significant and sometimes not, and most interactions with the time dummy are either not statistically significant or do not seem economically significant. The two important exceptions are time dummies with external debt/GDP and and the financial depth measure M2/GDP. Here, the general finding is that interactions are significant but only for particular asset classes.

For FDI, the coefficient on the interaction term of the time dummy with M2/GDP is negative and significant, suggesting that the effect of financial depth on FDI is significantly greater prior to 1990 than after 1990 (although it remains positive and significant also after 1990). The structural change may be due in part to globalization which increased access to foreign financing for FDI, reducing the overall importance of domestic financial depth to finance foreign direct investments.

For FPI, the coefficient on the interaction term of the time dummy with the short-term external debt/GDP is negative and significant, suggesting that the effect of external debt on FPI is significant and negative after 1990, while it was not prior to 1990. In part this may reflect a changing motivation of FPI over recent years. Prior to 1990 FPI may have been motivated more substantially by capital flight concerns, enough so to lead to the overall finding that foreign equity investments prior to 1990 were positively correlated with external debt (unlike FDI and FX reserves). However, over recent years, more standard portfolio considerations, such as those explored in Malik (2011) and Bai and Zhang (2012), may have dominated to lead to the same negative correlation between external debt/GDP and FPI after 1990.

This result, in itself, is interesting because FPI from emerging economies is likely to be increasingly important in global financial markets in coming years and it would be encouraging to conclude, even if based on stylized regressions, that considerations behind FPI from emerging economies are driven increasingly by more stable portfolio considerations than they were in the capital flight era.

As mentioned, the above results are based on fixed effect method of estimation but interpretation of estimated coefficient requires caution due to the issues of endogeneity. Endogeniety can plague the results and hence interpreting these results in terms of causality may be detrimental. This issue can arise from several variables but the foremost variable with an endogeneity concern is trade openness measure and current account surplus. The next section uses instrument variable approach to see if and how results can be affected when bilateral, regional and multilateral trade agreements are used as an instrument for trade openness and current account surplus.

## 4.4 Alternative regression specifications

### 4.4.1 Endogeniety

With a fixed effects model, the estimators depend on the assumption of strict exogeneity i.e, for normally distributed $\epsilon_{it}$ the assumption $Cov(x_{it}, \epsilon_{it}) = 0$. However, this assumption is violated if any of the regressand are not independent of the error term for example because of simultaneity. In my analysis, there is one potential source of endogeniety that can come from variables relating trade: trade openness and trade surplus. Trade openness, which is measured as the ratio of sum of exports and imports to GDP can be endogenous for example by the reasoning that financial openness affects activity in the outflows of foreign assets which can then result into income that can be used to increase or decrease imports or exports. Similarly, trade surplus which is measured as the ratio of net exports to GDP, is in equilibrium relation with the purchase of financial assets through the basic identity relation linking balance of payment and national income. Hence, there can be a potential endogeneity issue present with trade surplus variable through simultaneity.

This section deals with these endogeneity issues by using two different specifications. In the first specification, the analysis substitutes trade variables with trade agreements data which includes preferential trade agreements, bilateral and multilateral agreements. Different classes of trade agreements can have different effects on trade activity and therefore, I also do the analysis with each type of agreements separately. However, the results are very similar however multilateral agreements are only few in number and hence data limitation does not allow a separate analysis based on these agreements. Therefore, the results provided in this paper are based on the total activity reflected from all types of trade agreements mainly because the results are qualitatively

and quantitatively very similar.[9] The second specification uses the aforementioned trade agreements variables as an instrument variable for trade openness and trade surplus.

As before, results with current account surplus and trade openness are very similar except for the respective related coefficients. The results are provided in Table C.8-C.11, where trade agreements are substituted for trade openness and trade surplus, while Table C.16- C.19, uses trade agreements as an IV for trade openness alone. The first specification compared to the results that used trade openness indicators, show three distinct variations. The results are very similar qualitatively and quantitatively very similar. Some of the evident variations include: (1) capital openness is becomes insignificant for the total assets and (2) GDP per capita becomes significant for FPI.

The later results of IV specification in Table C.16- C.19 are based on the battery of post estimation tests which includes the endogeniety test and weak-instrument-robust inference tests using Anderson-Rubin Wald test which are provided in the Table C.12-C.15. The endogeniety test reveals that trade openness indeed presents problems relating endogeneity but weak-instrument-robust inference tests show that trade agreements variable is a strong instrument for trade openness. Nevertheless, it must be noted that the precision of IV estimates is lower than that of OLS estimates. In the presence of weak instruments (excluded instruments only weakly correlated with included endogenous regressors) the loss of precision will be severe, and IV estimates may be no improvement over OLS. This suggests we need to evaluate whether a particular regressor must be treated as endogenous. With regards to current account surplus the post estimation results of the first-stage F-stat heteroskedasticity-robust tests indicate that trade agreements are a weak instrument for current account surplus despite the fact that there exist endogeniety issue with current account surplus. Therefore, these results are not

[9]Data on trade agreement is compiled from United Nations Economic and Social Commission for Asia and the Pacific (ESCAP). Any agreement that is signed, whether in force or under negotiation is included to capture the activity of trade openness from a *dejure* point of view.

presented.

Comparison between Table C.16- C.19 and previous corresponding tables without IV specification or columns 2 and 4 in the comparison table F.1 - F.4, show that the results from these two specification are very similar in magnitude and signs, however there are four main differences that are worth highlighting in this section. These differences emerge with regards to FDI. The first difference is that financial depth variable looses significance. The second key difference is that apart from a specification IV that is based on an interaction between year dummy and financial depth, total assets and FX loose significance with regards to anti-corruption variable (Table C.16 and Table C.17, column 4). However, the evidence for the theory that FPI was driven largely by capital flight prior to 1990, though much less so after 1990, highlighted in the Non-IV specification is reinforced by using the alternative IV approach as the significance of interaction of year and debt variable stays negatively significant (see Table F.4, column 2 and 4). Whereas, FDI investments loose significance with regards to the interaction variable between year dummy and short term debt in specification III suggesting the negative influence of short term debt before and after 1990. This is in contrast to the results of the Non-IV specification discussed in section 4.3.3. Lastly, capital openness and GDP per capita that has been insignificant for FDI and FPI are now significant under instrument variable approach for total assets. As a results of this alternative specification with IV, the R square for all the specifications have improved.

### 4.4.2 Common Trends

In this section, I redo the analysis with non-detrended data for comparison with the aforementioned IV and Non-IV specifications of detrended data. The results corre-

sponding to the Non-IV regression and the IV regression using the detrended and non-detrended data are reported in the Table F.1 - F.4 in the Appendix F. First of all, the results with detrended and un-detrended data are economically as well as statistically, very similar. However, there are four important obeservations from these results: (1) For all classes of foreign assets except for FPI, trade openness indicator, both with IV and Non-IV specifications, have smaller coefficients as compared to the coefficients from the non-detrended data. The new results still show economic and statistical significance. However, trade openness seem to have no significant effect on the accumulation of FPI for detrended data. (2) External debt still negatively affects the accumulation of all types of assets including FDI where the affect seems to be consistent with all specifications. However, detrended results show that the effects are still present in the non-linear specification that includes an interaction between debt variable and time. This shows that the non-linearity of external debt may be an important avenue for future research.[10] Therefore, capturing these results with a linear specification may not show any effects. With regards to FPI, the results associated with this variable as well as the interaction term with year further confirms the theory of FPI investment more recently being driven by portfolio consideration rather than by capital flight motives. (3) In contrast to detrended data, non-detrended specification reveals that capital openness seems to be an unimportant variable for accumulation of all types of assets. (4) Lastly, the R squared from the detrended data is smaller than the R squared from non-detrended data, as anticipated given that the explanatory power reduces if time trends has been removed.

This section shows that with some differences highlighted above, the overall effects of the outlined determinants of foreign asset accumulation remain largely unchanged, which provides a further robustness check for the previously presented results.

[10]See for e.g. Malik(2011) for theoretical model that highlights the non-linear effect of external debt on the accumulation of assets especially FDI.

In the Appendix E.1, I also provide a counterpart analysis with industrialized economies which is very close to Milesi-Ferretti and Lane (2003) except that I use extended data and more explanatory variables to facilitate an easy comparison with emerging economies analysis provided in this paper. For easy comparison, the results for total assets and each class of assets are provided in Table F.5-F.8 and the discussion of results is provided in Appendix E.1, Section E.1.

## 4.5 Conclusion

Over the past 20 years emerging economies have started to accumulate considerable foreign assets. Most noticeably there has been a large increase in FX reserves, but also FDI and FPI investments originating from emerging economies have increased substantially. The general trend, however, masks considerable heterogeneity both in the level and composition of foreign assets held by different emerging economies. In this paper, I have studied determinants of the time and cross-country variation in the level and composition of international investments originating from emerging economies over the time period 1970-2007, focusing on a large set of macroeconomic, institutional, financial and trade variables, and controlling for country-fixed effects.

Predictably, trade openness is easily the most important, especially for FX reserves which dominate the total foreign assets accumulated by emerging economies. There are however serious concerns over endogeniety with regards to trade openness measure and the IV regressions confirm that the effect of trade openness remains quantitatively and qualitatively significant. There is, however, also some evidence that financial deepening is associated with an increase in foreign assets, but that for foreign direct investments this affect has become less important in the wake of financial globalization when access

to foreign capital increased for emerging economies. In addition, more indebted developing countries tend to have smaller FX reserve ratios and foreign direct investments. Prior to 1990, there is no evidence of similar effects of external debt on FPI, which may be due to a balancing of two different effects: (1) external debt increases the potential of future tax increases and therefore motivates capital flight, (2) on the other hand, external debt increases default risk and therefore reduces incentives to invest abroad for risk-sharing purposes (as outlined in Malik (2011) and Bai and Zhang (2012)). Prior to 1990, these two forces may cancel out with respect to FPI (which is the most liquid way to achieve capital flight), but after 1990 I find evidence that FPI is also negatively correlated with external debt suggesting that the more stable diversification channel is becoming more important than capital flight for FPI.

Except for financial deepening that becomes insignificant for FDI and FPI, all of the other results are sustained when instrument variable approach is applied. When comparison is made between different groups of countries, total foreign assets and FDI behaves very similarly to the macroeconomic, institutional, trade and financial variables. However, stark differences are present in terms of FX and FPI which highlights inherent differences between these economies. One of the reason could be that emerging economies are still at an early stage of learning by doing, when it comes to utilizing FPI for diversification purposes and therefore, key differences are evident. Another reason can be that FX reserves due to its liquidity, might be more favorable form of assets for countries that are vulnerable and can require quick fix to the economy through reserves in the event of crisis episodes. This is evident from a strong negative relation between FX and crisis events in emerging economies but it is absent from industrialized economies.

I view the partial correlations generated by the panel study in this paper as a first step towards further research on determinants of foreign investments from emerging

economies, that are likely to become increasingly important as emerging economies grow and account for an ever increasing fraction of world output. The results establish some stylized facts, that overall provide some support for the theory that foreign investments from emerging economies are increasingly motivated by many due to standard portfolio considerations that motivate foreign investments from industrial economies with a longer history of foreign investment. The empirical correlations can inform theoretical work on the modeling of foreign investment behavior in emerging economies, but it would be desirable to explore estimation of structural models to make further progress, so that results could be used to provide a more solid normative interpretation for investment behavior.

APPENDIX A

# APPENDIX CHAPTER 1

## A.1 Preliminaries

To simplify notation I continue to denote the felicity function by $u$. The proofs utilize the following well-known property of CRRA utility: For $\gamma > 0$ $u$ is multiplicatively separable in the sense that $u(AB) = u(A)u(B)$, while for $\gamma = 0$ $u(x) = \log(x)$ satisfies $u(AB) = u(A) + u(B)$.

*Claim 1:* Assumption 1 is equivalent to the following set of inequalities: $A < \underline{a} < (1 + r) < \mu < \bar{a} < \underline{a} + A$.

**Proof.** Parts (1) and (2) of Assumption 1 are equivalent to $A < \underline{a} < (1 + r) < \mu < \bar{a}$. Since $Std(a) = (\bar{a} - \underline{a})/2$, part (3) of Assumption 1 is equivalent to $\bar{a} < \underline{a} + A$. ■

*Claim 2:* Assumption 2 is equivalent to the following set of inequalities: $2A < 2\underline{a} < 2(1 + r) < \bar{a} < \underline{a} + 2A$.

**Proof.** Parts (1) and (2) of Assumption 2 are equivalent to $2A < 2\underline{a} < 2(1 + r) < \bar{a}$. Since $Std(a) = (\bar{a} - \underline{a})/2$, part (3) of Assumption 1 is equivalent to $\bar{a} < \underline{a} + 2A$. ■

## A.2 Proofs

**Proof of Proposition 2.** The unique efficient allocation is found by backward induction. Fix any $(K_1, D_1, \theta_1)$. By the assumption $a_2^s \in \{\bar{a}, \underline{a}\} > A$, period 2 utility from $K_2^T = (0, 0)$ and $K_2^M = (K_1, K_1)$ is always at least as great as the utility from any other period 2

capital allocation. Moreover, if $(K_1, \theta_1) >> 0$ the preference is strict. Hence, consider the following simplified period 2 value function in state $s \in \{H, L\}$:

$$v_2^s(K_1, \theta_1, D_1) = u(a_s \theta_1 K_1 + (2\mu - a_s)(1 - \theta_1)K_1 - (1 + r)D_1) \tag{A.1}$$

Now turn to the period 1 problem. Using the simplified period 2 value function in Eq. (A.1), the period 1 value function is

$$\begin{aligned} v_1(\bar{K}, \bar{\omega}) &= \max_{\{K_1 \geq 0, D_1, \theta_1 \in [0,1]\}} u(A\bar{K} + D_1 - K_1) + \frac{\beta}{2}\left[v_2^H(K_1, \theta_1, D_1) + v_2^L(K_1, \theta_1, D_1)\right] \\ s.t \quad D_1 &\leq \bar{\omega} K_1 \end{aligned}$$

can be written as:

$$\begin{aligned} v_1(\bar{K}, \bar{\omega}) &= \max_{\{K_1 \geq 0, D_1, \theta_1 \in [0,1]\}} u(A\bar{K} + D_1 - K_1) \\ &+ \frac{\beta}{2}[u(\bar{a}\theta_1 K_1 + (2\mu - \bar{a})(1 - \theta_1)K_1 - (1 + r)D_1) \\ &+ u(\underline{a}\theta_1 K_1 + (2\mu - \underline{a})(1 - \theta_1)K_1 - (1 + r)D_1)] \qquad \text{(A.2)} \\ s.t \quad D_1 &\leq \bar{\omega} K_1 \qquad \text{(A.3)} \end{aligned}$$

We can solve for an optimal $\theta_1$ independently of the $(K_1, D_1)$ decision because of the concavity of $u$. Fix any $(K_1, D_1)$ (feasible) and define

$$A: = \theta_1\left[(\bar{a} - \underline{a})K_1 + \underline{a}K_1 - (1 + r)D_1\right] + (1 - \theta_1)\left[\underline{a}K_1 - (1 + r)D_1\right] \tag{A.4}$$

$$B: = \theta_1\left[(\underline{a} - \bar{a})K_1 + \bar{a}K_1 - (1 + r)D_1\right] + (1 - \theta_1)\left[\bar{a}K_1 - (1 + r)D_1\right] \tag{A.5}$$

For a given $(K_1, D_1)$ and an arbitrary $\theta_1 \in [0, 1]$ note that period 2 expected utility is given by $(1/2)u(A) + (1/2)u(B)$, while expected utility for $\theta = 1/2$ is given by $u[(A + B)/2]$. Since $u$ is concave

$$u\left(\frac{A + B}{2}\right) \geq \frac{1}{2}u(A) + \frac{1}{2}u(B) \tag{A.6}$$

and the inequality is strict whenever $K_1 > 0$. It therefore remains to show that with $K_2^T = (0,0)$ and $\theta_1 = 1/2$ there exist unique optimal solutions for $K_1$ and $D_1$ in which $K_1 > 0$ and $D_1 = \bar{\omega}K_1$. With $\theta_1 = \frac{1}{2}$ the period 1 value function can be written as:

$$\begin{aligned} v_1(\bar{K}, \bar{\omega}) &= \max_{\{K_1 \geq 0, D_1\}} \quad u(A\bar{K} + D_1 - K_1) \\ &+ \frac{\beta}{2}[u(\underbrace{\frac{1}{2}\bar{a}K_1 + \frac{1}{2}(2\mu - \bar{a})K_1}_{\mu K_1} - (1+r)D_1) \\ &+ u(\underbrace{\frac{1}{2}\underline{a}K_1 + \frac{1}{2}(2\mu - \underline{a})K_1}_{\mu K_1} - (1+r)D_1)] \qquad \text{(A.7)} \\ s.t \quad D_1 &\leq \bar{\omega}K_1 \qquad \text{(A.8)} \end{aligned}$$

We now argue that $K_1 = 0$ is always strictly dominated. Suppose $K_1 = 0$ then by the constraint $c_2 \geq 0$ this implies $D_1 \leq 0$. Suppose first that there is any feasible plan with $D_1 = 0$, then $c_2 = 0$ and for $\epsilon > 0$ and sufficiently small $K_1 = \epsilon$ is feasible. Moreover, by the Inada condition on $u$, for $\epsilon$ sufficiently small, $K_1 = \epsilon$ strictly dominates $K_1 = 0$. Hence, $K_1 = 0$ and $D_1 = 0$ is strictly dominated by a plan with $K_1 > 0$ and $D_1 \leq 0$. Now suppose $K_1 = 0$ and $D_1 < 0$ but feasible, with corresponding $c_1 \geq 0$. Then consider the alternative plan $(\hat{K}_1, \hat{D}_1, \hat{c}_1) = (-D_1, 0, c_1)$. This plan is feasible since $(K_1, D_1, c_1)$ is feasible, and by the assumption 1, it can be noted that $\mu > (1+r)$, this plan strictly dominates $(K_1, D_1)$ because it leads to strictly greater $c_2$ in both states, $u$ is strictly increasing and $\beta > 0$.[1] Hence, $K_1 = 0$ is always strictly dominated by a plan with $K_1 > 0$.

Now suppose that $K_1 > 0$, then we argue that $D_1 < \bar{\omega}K_1$ is strictly dominated by $\hat{D}_1 = \bar{\omega}K_1$. To see this, suppose that there is a feasible plan with $D_1 = \bar{\omega}K_1 - \epsilon$ for some

[1] To understand how assumption 1 implies $\mu > (1+r)$, consider $\mu > 2(1+r) - \underline{a}$ and $\underline{a} < 2(1+r) - \underline{a}$. These two assumptions together implies $\mu > 2(1+r) - \underline{a} > 2(1+r) - (1+r) = (1+r)$.

$\epsilon > 0$ and period 1 consumption of $c_1 \geq 0$. Then the plan $(\hat{K}_1, \hat{D}_1, \hat{c}_1) = (K_1+\epsilon, D_1+\epsilon, c_1)$ is feasible. Since $c_1$ remains unchanged period 1 utility remains unchanged. However, $c_2$ increases by $(\mu - (1 + r))\epsilon > 0$ (by Assumption 1). Hence, for $K_1 > 0$, $D_1 < \bar{\omega}K_1$ is strictly dominated by $\hat{D}_1 = \bar{\omega}K_1$.

It therefore remains to show that there exists a unique $K_1 > 0$ that solves the following optimization problem:

$$\max_{K_1>0} \; u\left(A\bar{K} - (1 - \bar{\omega})K_1\right) + \beta u\left((\mu - \bar{\omega}(1 + r))K_1\right) \tag{A.9}$$

It is straightforward to verify that the objective function is continuously differentiable and strictly concave and so the following first order condition is necessary and sufficient for a solution to (A.9):

$$f(K_1) := \beta(\mu - \bar{\omega}(1 + r))u'\left((\mu - \bar{\omega}(1 + r))K_1\right) - (1 - \bar{\omega})u'\left(A\bar{K} - (1 - \bar{\omega})K_1\right) = 0 \tag{A.10}$$

Note that

$$f'(K_1) = \beta \underbrace{u''\left(\mu K_1 - (1 + r)\bar{\omega}K_1\right)}_{<0 \text{ by concavity}} \underbrace{(\mu - (1 + r)\bar{\omega})^2}_{>0} + \underbrace{(1 - \bar{\omega})^2}_{>0} \underbrace{u''\left(A\bar{K} - (1 - \bar{\omega})K_1\right)}_{<0 \text{ by concavity}} < 0 \tag{A.11}$$

$$\lim_{K_1 \to 0} f(K_1) > 0 \tag{A.12}$$

$$\lim_{K_1 \to \frac{A\bar{K}}{1-\bar{\omega}}} f(K_1) < 0 \tag{A.13}$$

Hence, by the intermediate value theorem, there exists a unique $K_1^* > 0$ that solves (A.10). It follows that $K_1^* > 0$, $D_1 = \bar{\omega}K_1^*$, $\theta_1 = (1/2)$, $K_2^T = (0, 0)$ and $K_2^M = (K_1^*, K_1^*)$ is the unique efficient allocation. ■

**Proof of Proposition 3.** The strongly efficient solution is again found by backward induction. In period 2 there are four possible default choices. By the assumption $\bar{a} > \underline{a} > A$ each default choice immediately determines an optimal period 2 capital allocation. Hence, there are four possible optimal plans in period 2 for any given $(K_1, D_1, \theta_1)$: (1)

$\lambda_2 = (1,1)$, $K_2^M = (K_1, K_1)$, $K_2^T = (0,0)$; (2) $\lambda_2 = (0,0)$, $K_2^M = (0,0)$, $K_2^T = (K_1, K_1)$; (3) $\lambda_2 = (1,0)$, $K_2^M = (K_1, 0)$, $K_2^T = (0, K_1)$; and (4) $\lambda_2 = (0,1)$, $K_2^M = (0, K_1)$, $K_2^T = (K_1, 0)$.

We next study the optimal period 1 decision corresponding to each of the four cases. Begin with case (1) and observe that by Proposition 2 we have that for any $(\bar{K}, \bar{\omega})$ there exists a $K_1^*(1) > 0$ such that $K_1^*(1) > 0$, $D_1 = \bar{\omega} K_1^*(1)$, $\theta_1 = (1/2)$ are the optimal period 1 choices. Now consider case (2). In this case $\theta_1 = 1$ clearly dominates any $\theta_1 < 1$, and dominates strictly if $K_1 > 0$. It follows exactly as in the proof for Proposition 2 that $K_1 > 0$ strictly dominates $K_1 = 0$. Moreover, using $\theta_1 = 1$, the constraint $D_1 = \bar{\omega} K_1$ clearly binds and it then follows as for case 1 that there exists $K_1^*(2) > 0$ such that $K_1^*(2) > 0$, $D_1 = \bar{\omega} K_1^*(2)$, $\theta_1 = 1$ are the optimal period 1 choices. Now consider case (3). Again, $\theta_1 = 1$ clearly dominates any $\theta_1 < 1$, and dominates strictly if $K_1 > 0$. It again follows from the same argument as above that $K_1 > 0$ strictly dominates $K_1 = 0$, and that therefore the constraint $D_1 = \bar{\omega} K_1$ must bind. It then follows as for case 1 that there exists $K_1^*(3) > 0$ such that $K_1^*(3) > 0$, $D_1 = \bar{\omega} K_1^*(3)$, $\theta_1 = 1$ are the optimal period 1 choices. Finally, consider case (4). Fix any $\theta_1 \in [0,1]$ and observe that by the same arguments as previously, $K_1 > 0$ and the constraint $D_1 = \bar{\omega} K_1$ binds. Now observe that in period 1, for any $K_1 > 0$ and $D_1 = \bar{\omega} K_1$ the expected period 2 utility under case (4) is

$$\frac{1}{2} u([A\theta_1] K_1) + \frac{1}{2} u\left( \left( [\underline{a}\theta_1 + \bar{a}(1-\theta_1)] - (1+r)\bar{\omega} \right) K_1 \right) \tag{A.14}$$

For $\theta_1 = 1$, the expected period 2 utility under case (3) is

$$\frac{1}{2} u(A K_1) + \frac{1}{2} u([\bar{a} - (1+r)\bar{\omega}] K_1) \tag{A.15}$$

Clearly, for any $\theta_1 \in [0,1]$ the expected utility in (A.14) dominated by the expected utility in (A.15), and dominated strictly whenever $K_1 > 0$. Hence, case (4) will not affect period 1 decisions. We are therefore left with three cases, each of which directly determines an optimal $\theta_1$ decision, and in each of which $K_1 > 0$ and the collateral constraint binds. We next determine which case dominates from a period 1 perspective. For this,

we use the fact that each case corresponds to a unique optimal choice of $\theta_1$ independently of $K_1$, and compare the respective expected period 2 utilities. Corresponding to each of the three remaining cases and for any $K_1 > 0$, these are therefore:

$$\text{Case 1: } u((\mu - (1+r)\bar{\omega})K_1) \tag{A.16}$$

$$\text{Case 2: } u(AK_1) \tag{A.17}$$

$$\text{Case 3: } \frac{1}{2}u((\bar{a} - (1+r)\bar{\omega})K_1) + \frac{1}{2}u(AK_1) \tag{A.18}$$

Now observe that CRRA utility is multiplicatively separable and, hence, for comparisons between the three cases, only the following part of the expected utilities are relevant

$$\text{Case 1: } u(\mu - (1+r)\bar{\omega}) \tag{A.19}$$

$$\text{Case 2: } u(A) \tag{A.20}$$

$$\text{Case 3: } \frac{1}{2}u((\bar{a} - (1+r)\bar{\omega})) + \frac{1}{2}u(A) \tag{A.21}$$

We now compare these three expected utilities to determine the $\omega_1$ and $\omega_2$.

- Case 1 < Case 2: By the assumption that $u$ is strictly increasing, this holds if and only if

$$A > \mu - (1+r)\bar{\omega} \tag{A.22}$$

$$\bar{\omega} > \frac{\mu - A}{1+r} =: \omega_3 \tag{A.23}$$

- Case 3 < Case 2: By the assumption that $u$ is strictly increasing, this holds if and

only if

$$A > (\bar{a} - (1+r)\bar{\omega}) \tag{A.24}$$

$$\bar{\omega} > \frac{\bar{a} - A}{1+r} =: \omega_2 \tag{A.25}$$

- Case 1 > Case 3: It is not possible to get a closed form solution, but we show that a unique $\omega_1$ exist between 0 and $\omega_3$ such that Case 1 > Case 3 if and only if $\bar{\omega} < \omega_1$. Define $f(\omega)$ as:

$$f(\omega) = u(\mu - (1+r)\omega) - \frac{1}{2}u(\bar{a} - (1+r)\omega) - \frac{1}{2}u(A) \tag{A.26}$$

First observe that

$$\frac{\partial f(\omega)}{\partial \omega} = -(1+r)u'(\mu - (1+r)\bar{\omega}) - \frac{1}{2}(-(1+r))u'(\bar{a} - (1+r)\bar{\omega}) \tag{A.27}$$

$$= \underbrace{-(1+r)}_{<0}\underbrace{\left[u'(\mu - (1+r)\bar{\omega}) - \frac{1}{2}u'(\bar{a} - (1+r)\bar{\omega})\right]}_{>0} \tag{A.28}$$

$$< 0 \tag{A.29}$$

Now note that

$$f(0) = u(\mu) - \frac{1}{2}u(\bar{a}) - \frac{1}{2}u(A) \tag{A.30}$$

By strict concavity of $u$,

$$u(\mu) > \frac{1}{2}u(\bar{a}) + \frac{1}{2}u(\underline{a}) \tag{A.31}$$

$$> \frac{1}{2}u(\bar{a}) + \frac{1}{2}u(A) \tag{A.32}$$

Hence, $f(0) > 0$. Next note that

$$f(\frac{\mu - A}{1+r}) = u(A) - \frac{1}{2}u(\bar{a} - (\mu - A)) - \frac{1}{2}u(A) \tag{A.33}$$

$$= \frac{1}{2}\left[u(A) - u(A + (\bar{a} - \mu))\right] \tag{A.34}$$

Since $\bar{a} > \mu$ and $u$ is strictly increasing, it follows that $f((\mu - A)/(1+r)) < 0$. Hence, by the continuity of $u$, there exists a unique $\omega_1 \in (0, \omega_3)$ such that $f(\omega) > 0$ if and only if $\omega < \omega_1$ and $f(\omega) = 0$ if and only if $\omega = \omega_1$.

- Now observe that we have $\omega_1, \omega_2, \omega_3$ such that $0 < \omega_1 < \omega_3 < \omega_2$, Also, for $\bar{\omega} \in [0, \omega_1)$ Case 1 strictly dominates Case 2 and Case 3; for $\bar{\omega} = \omega_1$ Case 1 and Case 3 lead to the same expected utility and both dominate Case 2; for $\bar{\omega} \in (\omega_1, \omega_2)$ Case 3 strictly dominates Case 1 and Case 2; for $\bar{\omega} = \omega_2$ Case 2 and Case 3 lead to the same expected utility and both dominate Case 1; and for $\bar{\omega} > \omega_2$ Case 2 strictly dominates Case 1 and Case 3. Note also that the values of $\omega_1, \omega_2, \omega_3$ hold *for all* $K_1 > 0$, i.e., do not depend on the $K_1$ actually chosen.

It therefore follows that for all values of $\bar{\omega}$, the planner can first determine the optimal case and then determine, given the optimal case, what will be the optimal $K_1 > 0$. Uniqueness then follows directly from the the uniqueness of the optimal $K_1^*$ for each case and the tie breaker rule in a strongly efficient allocation. This therefore completes the proof. ■

**Proof of Proposition 4.** First recall from the proof of Proposition 3 that $0 < \omega_1 < (\mu - A)/(1 + r)$. By Assumption 2, $\bar{a} < \underline{a} + 2A$, which implies that $\mu < \underline{a} + A$ and therefore $\omega_1 < \underline{a}/(1 + r)$.

Now start with part (1) of the Proposition. Fix $\bar{K} > 0$ and let $\bar{\omega} \in [0, \omega_1]$. Suppose that the price $P = 1$. Then the planning problem facing the open economy is identical to the problem in Section 2.2. Moreover, Assumption 2 implies that $\mu > (1 + r)$ (from $\bar{a} > 2(1+r)$) and it therefore follows from Proposition 3 that there exist a unique $K_1^* > 0$, such that $(K_1^*, D_1^* = \bar{\omega} K_1^*, \theta_1^* = 1/2, \lambda_2^* = (1, 1), K_2^{M*} = ((1/2)K_1^*, (1/2)K_1^*), K_2^{T*} = (0, 0))$ is the unique optimal plan for the borrower country. Moreover, given $\lambda_2^* = (1, 1)$ the no arbitrage condition implies that $P = 1$. Hence, this is a Type I risk adjusted equilibrium.

Now note that for any $P \geq 0$ the collateral constraint implies that it is never optimal for the borrower country to default since the period 2 value function is identical to the

period 2 value function in Section 2.2, and with a debt to capital ratio $D_1/K_1 < \omega_1$ it follows from the proof of Proposition 3 that default in period 2 is never optimal. As a result, an optimal plan for the borrower country always involves $\lambda_2 = (1, 1)$. Hence, any price $P \neq 1$ can not occur in a risk adjusted equilibrium. Given the tie breaker rule for $\bar{\omega} = \omega_1$, this proves uniqueness.

Now look at part (2) of the Proposition. First suppose that $P = 1/2$. To show that the collateral constraint will bind at an optimal plan, first consider the case when the default decision in period 2 is $\lambda_2 = (1, 0)$. Suppose for sake of contradiction that $(c_1, K_1, D_1) \geq 0$ is part of a feasible plan in which $D_1 = \bar{\omega}K_1 - \epsilon$ for some $\epsilon > 0$ (hence, the collateral constraint does not bind). Consider an alternative plan in which period 1 choices have changed to $(\hat{c}_1, \hat{K}_1, \hat{D}_1) = (c_1, K_1 + (\epsilon/2), D_1 + \epsilon)$. Note that at a price of $P = 1/2$ this plan is feasible because the plan $(c_1, K_1, D_1)$ was feasible by assumption. Under the new plan consumption in period 1 is unchanged and the change in period 2 consumption in state $H$ is $(\bar{a}(\epsilon/2) - (1 + r)\epsilon)$. By Assumption 2, $\bar{a} > 2(1 + r)$ and therefore the last term is strictly positive. The change in period 2 consumption in state $L$ is $A(\epsilon/2) > 0$. Hence, expected utility under the plan $(\hat{c}_1, \hat{K}_1, \hat{D}_1)$ is strictly greater because $u$ is strictly increasing. By an analogous argument, the collateral constraint binds when the default decision in period 2 is $\lambda_2 = (1, 1)$. When the default decision is $\lambda = (0, 0)$ the collateral constraint necessarily binds, since additional borrowing can always be used to increase period 1 utility without any decrease in period 2 utility (due to default). Finally, as in the proof of Proposition 3 it is straightforward to show that the default decision $\lambda = (0, 1)$ is dominated (and strictly dominated whenever $K_1 > 0$). The collateral constraint therefore binds for all relevant (i.e., not always dominated) period 2 default decisions, and the collateral constraint must therefore bind at an optimal plan. However, since the period 2 value function is identical to the value function in Section 2.2, it follows just as in Proposition 3 that when the collateral constraint binds and

$\bar{\omega} \in (\omega_1, \omega_2)$, there exists a unique $K_1^* > 0$ such that the unique optimal plan of the borrower country is $(K_1^*, D_1^* = \bar{\omega}K_1^*, \theta_1^* = 1, \lambda_2^* = (1,0), K_2^{M*} = (K_1^*, 0), K_2^{T*} = (0, K_1^*))$. Also, given $\lambda_2^* = (1,0)$ the no arbitrage condition implies that $P = 1/2$. Hence, for $\bar{\omega} \in (\omega_1, \omega_2)$, this is a Type II risk adjusted equilibrium.

To show uniqueness of the RAE found above for $\bar{\omega} \in (\omega_1, \omega_2)$, first suppose that $P > 1/2$. Then it is clear that at any optimal plan the collateral constraint binds and therefore $\lambda_2 = (1,0)$. It follows that $P$ is not consistent with the no arbitrage condition. Now suppose that $P < 1/2$. This can be consistent with the no arbitrage condition only if $P = 0$ and $\lambda_2 = (0,0)$. But for $\bar{\omega} \leq \omega_2$ it follows from Proposition 3 that the representative agent is always at least as well-off not defaulting in the high state. Hence, $P = 1/2$ is the unique price at which there exists a risk adjusted equilibrium when $\bar{\omega} \in (\omega_1, \omega_2)$.

Finally, note that under Assumption 2, it is not the case that $\omega_2 \leq \underline{a}/(1+r)$. Since from Assumption 2, $\bar{a} > 2\underline{a} > \underline{a} + A$, it follows that $\omega_2 := (\bar{a} - A)/(1+r) > \underline{a}/(1+r)$. As a result, for the range of $\bar{\omega}$ considered, $\bar{\omega} \in \underline{a}/(1+r)$, the two types of RAE equilibria found above are both mutually exclusive and collectively exhaustive. ■

**Proof of Proposition 5.** For any $K_1 > 0$ and $D_1$ use the notation $\alpha_1 := D_1/K_1$. Note that for any given $(K_1, D_1, \theta_1)$ from period 1, the period 2 value function is identical to the value function from Section 2.2. From the proof of Proposition 3 we therefore have that if $K_1 > 0$ and $\alpha_1 \in [0, \omega_1]$ the optimal default decision in period 2 is $\lambda_2 = (1,1)$ and so in period 1 the optimal $\theta_1 = 1/2$. If $\alpha_1 \in (\omega_1, \omega_2]$ the optimal default decision in period 2 is $\lambda_2 = (1,0)$ and in period 1 the optimal $\theta_1 = 1$; and if $\alpha_1 > \omega_2$ the optimal default decision is $\lambda_2 = (0,0)$ and in period 1 the optimal $\theta_1 = 1$. Given that the optimal $\theta_1$ is determined jointly with the optimal default decision, it is enough to look at demand conditional on $\alpha_1$. The demand for bonds then follows directly from the linear

optimization problem faced by international investors:

$$d(K_1, D_1, \theta_1, P) = \begin{cases} \infty \quad \text{if} & P < 1 \text{ and } \alpha_1 \leq \omega_1 \\ & P < \frac{1}{2} \text{ and } \alpha_1 \leq \omega_2 \\ [0, \infty] \quad \text{if} & P = 1 \text{ and } \alpha_1 \leq \omega_1 \\ & P = \frac{1}{2} \text{ and } \alpha_1 \in (\omega_1, \omega_2] \\ & P = 0 \text{ and } \alpha_1 > \omega_2 \\ 0 \quad \text{if} & P > 1 \\ & P > \frac{1}{2} \text{ and } \alpha_1 \in (\omega_1, \omega_2] \\ & P > 0 \text{ and } \alpha_1 > \omega_2 \end{cases} \tag{A.35}$$

Now consider the optimization problem of the borrower country in period 1. If the country accumulates a strictly positive amount of capital ($K_1 > 0$) and issues a strictly positive quantity of bonds ($D_1 > 0$) such that $\alpha_1 \leq \omega_1$, then the supply of bonds equals the demand for bonds if and only if $P = 1$. Hence, we have that $P(K_1, D_1) = 1$ if $(K_1, D_1) > 0$ and $\alpha_1 \leq \omega_1$. We have from Proposition 3 that subject to the constraint $D_1 \leq \bar{\omega} K_1$ for any $\bar{\omega} \in [0, \omega_1]$ the optimal $K_1$ is strictly positive and the collateral constraint binds. Hence, any plan with $K_1 = 0$ is strictly dominated. Hence, we focus only on $K_1 > 0$. Moreover, since the collateral constraint binds *for all* $\bar{\omega} \in [0, \omega_1]$, we have that if at an optimal solution $\alpha_1 \leq \omega_1$ then this is an equality.

Now suppose the country accumulates capital and issues bonds such that $\alpha_1 \in (\omega_1, \omega_2]$, then the supply of bonds equals the demand for bonds if and only if $P = 1/2$. Hence, we have that $P(K_1, D_1) = 1/2$ if $\alpha_1 \in (\omega_1, \omega_2]$. Using a similar argument to the previous paragraph, we have from Proposition 4 that if at an optimal solution $\alpha_1 \in (\omega_1, \omega_2]$ then $\alpha_1 = \omega_2$.

Finally, suppose that the country accumulates capital and issues bonds such that $\alpha_1 > \omega_2$. Then the supply of bonds equals the demand for bonds if and only if $P = 0$. Then the optimization problem in period 1 is essentially identical to the optimization problem for $\alpha_1 = 0$. However, from above we have that if $\alpha_1 \in [0, \omega_1]$, the optimal $\alpha_1 = \omega_1$ and hence this strictly dominates any $\alpha_1 > \omega_2$.

With the notation from Proposition 4, now suppose that

$$\bar{v}(\bar{K}, \omega_2, 1/2) > \bar{v}(\bar{K}, \omega_1, 1) \ . \tag{A.36}$$

Then it follows from the preceding arguments that the borrower country solves for an optimal $K_1$ with $\theta_1 = 1$ and under the (market imposed) constraint that $\alpha_1 = \omega_2$. Hence, it follows from Proposition 4 that there is a unique ECE with $K_1^* > 0$ such that the allocation $K_1^*$, $D_1^* = \omega_2 K_1^*$, $\theta_1^* = 1$, $\lambda_2^* = (1, 0)$, $K_2^{M*} = (K_1^*, 0)$, $K_2^{T*} = (0, K_1^*)$, and the price is $P = 1/2$. For the opposite (weak) inequality, it follows in a similar manner that there exists a unique $K_1^*$ such that the allocation $K_1^*$, $D_1^* = \omega_1 K_1^*$, $\theta_1^* = 1/2$, $\lambda_2^* = (1, 1)$, $K_2^{M*} = ((1/2)K_1^*, (1/2)K_1^*)$, $K_2^{T*} = (0, 0)$ and the price $P = 1$ is the unique ECE. Existence of an ECE therefore follows by construction. ■

**Proof of Proposition 6.** For any $K_1 > 0$ and $D_1 \geq 0$, again use the notation $\alpha_1 := \frac{D_1}{K_1}$. First consider the decision problem of the open economy in period 2. Decisions regarding the allocation of capital between the modern and traditional sector are analogous to the proof of Proposition 3. Recalling the cases compared in the proof of Proposition 3, the corresponding comparisons between different default regimes under log-utility are as follows:

$$\text{Case 1: } log(\mu - (1 + r)\alpha_1) + log(K_1) \tag{A.37}$$

$$\text{Case 2: } log(A) + log(K_1) \tag{A.38}$$

$$\text{Case 3: } \frac{1}{2} log(\bar{a} - (1 + r)\alpha_1) + \frac{1}{2} log(A) + log(K_1) \tag{A.39}$$

The special feature of log-utility is that the problem of solving for the optimal $K_1$ is independent of the problem of solving for the optimal default decision in period 2 because of the additive separability.

In order to determine the optimal default decision for period 2, we make pairwise comparisons between the expected utility given each of the three relevant cases. Depending on values of $\alpha_1 \geq 0$ we can compare the expected utilities under each of the three cases from an *ex-ante* perspective.

- First compare the expected utility for case (1) and case (2). It follows immediately from the fact that log is strictly increasing that case (2) dominates case (1) if and only if

$$\begin{aligned} A &\geq \mu - \alpha_1(1+r) && \text{(A.40)} \\ \Leftrightarrow \quad \alpha_1 &\geq \frac{\mu - A}{1+r} && \text{(A.41)} \end{aligned}$$

- Next compare the expected utility for case (2) and case (3). It follows immediately from the fact that log is strictly increasing that case (2) dominates case (3) *ex-ante* if and only if

$$\begin{aligned} A &\geq \bar{a} - \alpha_1(1+r) && \text{(A.42)} \\ \Leftrightarrow \quad \alpha_1 &\geq \frac{\bar{a} - A}{1+r} && \text{(A.43)} \end{aligned}$$

- Now compare the expected utility for case (3) and case (1). Using the quadratic formula and simple algebra manipulations, it is possible to show that case (3) dominates case (1) *ex-ante* if and only if

$$\begin{aligned} \sqrt{A(\bar{a} - \alpha_1(1+r))} &\geq \mu - \alpha_1(1+r) && \text{(A.44)} \\ \Leftrightarrow \quad \alpha_1 &\geq \frac{2\mu - A}{2(1+r)} \\ &- \frac{\sqrt{(A)^2 + 4A(\bar{a} - \mu)}}{2(1+r)} && \text{(A.45)} \end{aligned}$$

- Finally, observe that

$$0 < \frac{2\mu - A - \sqrt{(A)^2 + 4A(\bar{a} - \mu)}}{2(1+r)} \tag{A.46}$$

$$< \frac{\mu - A}{1+r} \tag{A.47}$$

$$< \frac{\bar{a} - A}{1+r} \tag{A.48}$$

$$\tag{A.49}$$

Hence, we define

$$\bar{\alpha}_1 = \frac{2\mu - A - \sqrt{(A)^2 + 4A(\bar{a} - \mu)}}{2(1+r)} \text{ and} \tag{A.50}$$

$$\bar{\alpha}_2 = \frac{\bar{a} - A}{1+r}, \tag{A.51}$$

Observe that $\bar{\alpha}_1 < 1$ by the following reasoning:

By assumption 2,

$$\begin{aligned} 2\underline{a} &< 2(1+r) \\ \Rightarrow 2\underline{a} + 2A &< 2(1+r) + 2A \end{aligned} \tag{A.52}$$

Again, by assumption 2,

$$\begin{aligned} \bar{a} &< \underline{a} + 2A \\ \Rightarrow \bar{a} + \underline{a} &< 2\underline{a} + 2A \end{aligned} \tag{A.53}$$

Using A.52 and A.53, it can be shown that:

$$\bar{a} + \underline{a} < 2\underline{a} + 2A < 2(1+r) + 2A$$

Hence

$$\begin{aligned} \bar{a} + \underline{a} &< 2(1+r) + 2A \\ \Rightarrow \mu &< (1+r) + A \\ \Rightarrow \frac{\mu - A}{1+r} &< 1 \end{aligned}$$

Also observe that $\bar{\alpha}_2 < 2$ by the following reasoning:

By using assumption 2,

$$\begin{aligned} 2(1+r) &> 2\underline{a} \\ \Rightarrow 2(1+r) + A &> 2\underline{a} + A \end{aligned}$$

Again, by assumption 2,

$$\begin{aligned} 2(1+r) + A &> \underline{a} + 2A \\ \Rightarrow \underline{a} + 2A &> \bar{a} \\ \Rightarrow \bar{a} - A &< 2(1+r) \\ \Rightarrow \frac{\bar{a} - A}{1+r} &< 2 \end{aligned}$$

Conclude from the preceding arguments that for $\alpha_1 \in [0, \bar{\alpha}_1]$ case (1) dominates the other cases and the optimal choice of $\theta_1$ is therefore $1/2$. For $\alpha_1 \in (\bar{\alpha}_1, \bar{\alpha}_2]$ case (3) dominates the other cases and the optimal choice of $\theta_1$ is therefore 1. For $\alpha_1 \geq \bar{\alpha}_2$ case (2) dominates the other cases and the optimal choice of $\theta_1$ is therefore 1.

Now consider the demand for bonds by international investors ($d_1(K_1, D_1, \theta_1, P)$). It follows (as in Proposition 5) from the linear optimization problem of the investors that

$d_1$ depends only on $P$ and $\alpha_1$, and is summarized as follows:

$$d(K_1, D_1, \theta_1, P) = \begin{cases} \infty \quad \text{if} & P < 1 \text{ and } \alpha_1 \leq \omega_1 \\ & P < \frac{1}{2} \text{ and } \alpha_1 \leq \omega_2 \\ [0, \infty) \quad \text{if} & P = 1 \text{ and } \alpha_1 \leq \omega_1 \\ & P = \frac{1}{2} \text{ and } \alpha_1 \in (\omega_1, \omega_2] \\ & P = 0 \text{ and } \alpha_1 > \omega_2 \\ 0 \quad \text{if} & P > 1 \\ & P > \frac{1}{2} \text{ and } \alpha_1 \in (\omega_1, \omega_2] \\ & P > 0 \text{ and } \alpha_1 > \omega_2 \end{cases} \tag{A.54}$$

Combining the optimal period 2 decision regarding default with the demand for bonds, we find that if $\alpha_1 \leq \bar{\alpha}_1$, the price of bonds will be $P = 1$. If $\alpha_1 \in (\bar{\alpha}_1, \bar{\alpha}_2]$, the price for bonds will be $P = 1/2$. If $\alpha_1 > \bar{\alpha}_2$ the price of bonds will be $P = 0$. From $\bar{\alpha}_1 \in (0, 1)$ and $\bar{\alpha}_2 \in (\bar{\alpha}_1, 2)$ we therefore have that $P\alpha_1 \in (0, 1)$ in any ECE.

It remains to determine the optimal $K_1$ in period 1. Due to the additive separability under the log-utility assumption, for all possible period 2 default regimes the optimal $K_1$ is determined by solving the following simplified optimization problem (for a given $\bar{K} > 0$ and $P\alpha_1 \in (0, 1)$):

$$\max_{\{K_1 > 0\}} \quad \log(A\bar{K} - (1 - P\bar{\omega})K_1) + \beta \log(K_1) \tag{A.55}$$

Since $u$ is strictly concave, twice continuously differentiable and satisfies an Inada condition at 0, first order conditions are necessary and sufficient for the existence of a unique solution to this problem and imply that the optimal $K_1$ in the log-utility case is

$$K_1(\bar{K}, \bar{\omega}, P) = \frac{\beta A \bar{K}}{(1 + \beta)(1 - P\bar{\omega})} \tag{A.56}$$

Note that $K_1$ is well defined because $P\alpha_1 < 1$.

We are now in a position to compare $\bar{v}(\bar{K}, \omega_2, 1/2)$ and $\bar{v}(\bar{K}, \omega_1, 1)$. Note that with the optimal $\hat{K}_1$ determined from (A.56):

$$\bar{v}(\bar{K}, \omega_1, 1) = \log(A\bar{K} - \hat{K}_1(1-\omega_1)) + \beta \log((\mu)\hat{K}_1 - (1+r)\omega_1\hat{K}_1) \quad \text{(A.57)}$$

$$\text{where } \hat{K}_1 = \frac{\beta A\bar{K}}{(1+\beta)(1-\omega_1)} \quad \text{(A.58)}$$

Likewise, with an optimal $K_1^*$ determined from (A.56) but for $P = 1/2$, we have that

$$\bar{v}(\bar{K}, \omega_2, 1/2) = \log(A\bar{K} - K_1^*(1-\frac{\omega_2}{2})) + \frac{\beta}{2}[\log(\bar{a}K_1^* - (1+r)\omega_2 K_1^*) + \log(AK_1^*)] \quad \text{(A.59)}$$

$$\text{where } K_1^* = \frac{\beta A\bar{K}}{(1+\beta)(1-\frac{1}{2}\omega_2)} \quad \text{(A.60)}$$

Now compare the two values to show that there exists an $\epsilon > 0$ such that for $|\underline{a} - A| \leq \epsilon$ the value from equation A.57 is strictly less than the value from equation A.59. For the following, denote by $\epsilon := \underline{a} - A$. Then it needs to be shown that

$$\log(A\bar{K} - \hat{K}_1(1-\omega_1)) + \beta \log(\mu\hat{K}_1 - (1+r)\omega_1\hat{K}_1) <$$
$$\log(A\bar{K} - K_1(1-\frac{\omega_2}{2})) + \frac{\beta}{2}[\log(\bar{a}K_1 - (1+r)\omega_2 K_1) + \log(AK_1)] \quad \text{(A.61)}$$

Substituting in for $\hat{K}_1$, $K_1^*$, $\omega_1$ and $\omega_2$, this simplifies to showing that

$$\log(AK_1^*) > \log(\mu\hat{K}_1 - (1+r)\omega_1\hat{K}_1) \tag{A.62}$$

$$\Leftrightarrow AK_1^* > (\mu\hat{K}_1 - (1+r)\omega_1\hat{K}_1) \tag{A.63}$$

$$\Leftrightarrow \frac{A\beta A\bar{K}}{(1+\beta)(1-\frac{\omega_2}{2})} > \frac{(\mu-(1+r)\omega_1)\beta A\bar{K}}{(1+\beta)(1-\omega_1)} \tag{A.64}$$

$$\Leftrightarrow \frac{1-\omega_1}{1-\frac{\omega_2}{2}} > \frac{\mu-(1+r)\omega_1}{A} \tag{A.65}$$

$$\Leftrightarrow \omega_1 > \frac{2(1+r)(\mu-A)-(\bar{a}-A)\mu}{[2(1+r)-(\bar{a}+A)](1+r)} \tag{A.66}$$

$$\Leftrightarrow \frac{(2\mu-A)-\sqrt{A[A+4(\bar{a}-\mu)]}}{2(1+r)} > \frac{2(1+r)(\mu-A)-(\bar{a}-A)\mu}{[2(1+r)-(\bar{a}+A)](1+r)} \tag{A.67}$$

$$\Leftrightarrow A[(2(1+r)-(2\mu+\epsilon))] > (2(1+r)-(2\mu-\epsilon))\sqrt{A[A+2(\bar{a}-\underline{a})]} \tag{A.68}$$

Since $(2(1+r)-(2\mu+\epsilon)) < 0$ this is equivalent to showing that

$$\frac{(2(1+r)-(2\mu+\epsilon))}{(2(1+r)-(2\mu-\epsilon))} < \frac{\sqrt{A[A+2(\bar{a}-\underline{a})]}}{2A} \tag{A.69}$$

Now just observe that the right hand side is strictly greater than 1, and that the left hand side converges to 1 as $\epsilon \to 0$. Hence, the above equality holds as long as $|\underline{a} - A|$ is sufficiently small. This therefore completes the proof. ■

## A.3 Description of Figures 2.1 and 2.2

*Data sources and time coverage:*

The data for FDI assets, portfolio equity assets, debt assets and debt liabilities is taken from Lane and Milesi-Ferretti (2007). Current US dollar GDP data is taken from the World Bank World Development Indicators. The data covers the time period 1970 through 2007 and is annual. Credit-ratings data is taken from Standards & Poors external debt credit rating.

*Country coverage:*

The dataset covers 36 emerging economies (according to IMF classification): Argentina, Brazil, Chile, China, Colombia, Croatia, Czech Republic, Ecuador, Egypt, Estonia, Hungary, India, Indonesia, Israel, Jordan, Korea, Latvia, Lithuania, Malaysia, Mexico, Morocco, Pakistan, Peru, Philippines, Poland, Romania, Russia, Singapore, Slovak Republic, Slovenia, South Africa, Thailand, Turkey, Ukraine, Uruguay and Venezuela.

The subset of countries in figure 2.2.1 and 2.2.2 are based on the credit ratings data from Standard & Poors. Countries that have a credit rating of BBB- and above are classified as investment grade (CR = 1), while countries with credit rating below BBB- are classified as speculative grade (CR=0). This classification is also based on Standard & Poors definition of investment and speculative grade. Countries in Speculative grade for the period 1990-2007 are Argentina, Brazil, Ecuador, India, Jordan, Morocco, Pakistan, Peru, Philippines, Turkey and Ukraine. Countries in Investment grade are Chile, China, Croatia, Czech Republic, Estonia, Israel, Latvia, Lithuania, Malaysia, Singapore, Slovenia and Thailand. The remaining countries are omitted in Figure 2.2 because their credit-rating changes over the time interval 1990-2007.

*Variables:*

All quantities are in current US dollars. Asset accumulation is the average sum of FDI and equity portfolio assets held abroad by domestic residents, and normalized with GDP. Debt accumulation refers to average net foreign currency denominated debt (debt liabilities - debt assets) normalized by GDP.

*Methodology:*

The best fit lines are obtained using a fractional polynomial fit in STATA. Figure 2.2.2 gives the best fit line with a 95% confidence interval.

Figure 2.1 averages over all 36 emerging economies on an annual basis over the period of 1970-2007. The net external debt stock starts to decrease from 1990 onwards. The upward trend for foreign asset accumulation by all emerging economies also starts in 1990.

Figure 2.2.1 looks at the heterogeneity in foreign asset accumulation by emerging economies. CR=0 and CR=1 refer to the credit rating of countries (CR = 0 means speculative grade for at least 1990-2007 and CR =1 means investment grade for at least 1990-2007). The same variables as in Figure 2.1 are depicted, but with annual averages taken within the two groups only. The figures illustrate that economies that are of at least investment grade experience much more stark increase in foreign asset stocks compared to emerging economies with a speculative grade on their external debt. In particular, countries with speculative grade have accumulated a negligible amount of foreign assets relative to GDP. Meanwhile, the external debt to GDP of countries with investment grade are considerably lower than for countries with a speculative grade, although there is a very general downward trend after 1990.

APPENDIX B

# APPENDIX CHAPTER 2

**Table B.1:** *List of Countries*

| Country Type | Emerging | Advanced |
|---|---|---|
| 1 | Argentina | Australia |
| 2 | Brazil | Austria |
| 3 | Chile | Belgium |
| 4 | China | Canada |
| 5 | Colombia | Denmark |
| 6 | Ecuador | Finland |
| 7 | Egypt | France |
| 8 | India | Germany |
| 9 | Indonesia | Greece |
| 10 | Israel | Iceland |
| 11 | Jordan | Ireland |
| 12 | Korea | Italy |
| 13 | Malaysia | Japan |
| 14 | Mexico | Netherlands |
| 15 | Morocco | Norway |
| 16 | Pakistan | Spain |
| 17 | Peru | Sweden |
| 18 | Philippines | Switzerland |
| 19 | Portugal | United Kingdom |
| 20 | Singapore | United States |
| 21 | South Africa | |
| 22 | Thailand | |
| 23 | Turkey | |
| 24 | Uruguay | |
| 25 | Venezuela | |

**Table B.2:** *Full Sample Liabilities: (1985-2007)*

| Stats | $\frac{FDI}{GDP}$ | $\frac{FPI}{GDP}$ | $\frac{Debt}{GDP}$ | $\frac{Total}{GDP}$ |
|---|---|---|---|---|
| Full Sample | | | | |
| p25 | .076058 | .0128028 | .3801419 | .5632541 |
| p50 | .1577802 | .0491577 | .5669314 | .8088205 |
| p75 | .2882503 | .1512946 | .8981233 | 1.275043 |
| mean | .2247362 | .1509928 | .75551 | 1.137985 |
| Advanced | | | | |
| p25 | .0861568 | .0393494 | .4846814 | .6455074 |
| p50 | .1815498 | .1024555 | .7557432 | 1.088716 |
| p75 | .3113096 | .2399529 | 1.195213 | 1.829892 |
| mean | .2431117 | .2570972 | 1.005656 | 1.520167 |
| Emerging | | | | |
| p25 | .0725869 | .00448 | .3281209 | .5311401 |
| p50 | .134385 | .0286944 | .4710821 | .7160432 |
| p75 | .2669539 | .076236 | .694321 | .9659828 |
| mean | .2100358 | .0662939 | .5553934 | .8322403 |

**Table B.3:** *Liabilities: Threshold Regression Results*

| Sample | Full | Emerging | Full | Emerging | Full | Emerging | Full | Emerging |
|---|---|---|---|---|---|---|---|---|
| Single Threshold | Total | Total | Debt | Debt | FDI | FDI | FPI | FPI |
| Threshold 1 | 1.058066 | 1.058066 | 0.9174 | 0.9174 | 0.528463 | 0.528463 | 0.064819 | 0.013589 |
| CImin | 1.011161 | 0.904716 | 0.898123 | 0.838934 | 0.055132 | 0.455604 | 0.054797 | 0.008575 |
| CImax | 1.627313 | 1.099032 | 1.043391 | 1.043659 | 0.809554 | 0.812568 | 0.069974 | 0.017391 |
| F | 17.307267 | 17.062492 | 22.640593 | 13.04432 | 13.026565 | 10.756596 | 30.239348 | 20.170104 |
| Bootstrap P | 0.053333 | 0.103333 | 0.033333 | 0.043333 | 0.153333 | 0.106667 | 0.01 | 0.03 |
| $\beta_t$ | 0.003068 | 0.005209 | 0.000431 | 0.000085 | 0.001417 | -0.003347 | 0.000443 | -0.001546 |
| OLS SE | 0.004088 | 0.005895 | 0.001228 | 0.001899 | 0.001227 | 0.002126 | 0.003992 | 0.005131 |
| HET SE | 0.007177 | 0.009722 | 0.001923 | 0.002394 | 0.00244 | 0.002827 | 0.004745 | 0.006273 |
| $\beta^1_{FL}$ | 0.975119 | 0.954454 | 1.005287 | 1.010049 | 1.022995 | 1.203085 | 0.930957 | 1.135867 |
| OLS SE | 0.03022 | 0.041708 | 0.015099 | 0.024483 | 0.014783 | 0.047303 | 0.030455 | 0.043254 |
| HET SE | 0.053772 | 0.070769 | 0.02183 | 0.028135 | 0.027206 | 0.053132 | 0.039742 | 0.047773 |
| $\beta^2_{FL}$ | 1.059983 | 1.061649 | 1.080516 | 1.091684 | 0.869331 | 0.859 | 1.062365 | 1.014274 |
| OLS SE | 0.030763 | 0.042803 | 0.019482 | 0.028296 | 0.045661 | 0.099138 | 0.030119 | 0.035482 |
| HET SE | 0.073785 | 0.093699 | 0.037711 | 0.041426 | 0.060672 | 0.089843 | 0.043303 | 0.056541 |
| Double Threshold | Total | Total | Debt | Debt | FDI | FDI | FPI | FPI |
| Threshold 1 | 1.058066 | 1.058066 | 0.832957 | 0.9174 | 0.413596 | 0.423 | 0.035209 | 0.013589 |
| Threshold 2 | 1.927312 | 1.868297 | 0.9174 | 1.412609 | 0.528463 | 0.528463 | 0.064819 | 0.065085 |
| CImin | 1.819795 | 1.868297 | 0.79367 | 1.190079 | 0.311886 | 0.308665 | 0.012347 | 0.054797 |
| CImax | 1.927313 | 1.950202 | 1.496052 | 1.614858 | 0.422333 | 0.424 | 0.035765 | 0.071572 |
| F | 45.676992 | 30.082647 | 23.638476 | 29.038687 | 21.537517 | 12.709697 | 31.953343 | 33.823233 |
| Bootstrap P | 0.003333 | 0.01 | 0.006667 | 0.083333 | 0.016667 | 0.063333 | 0.003333 | 0.01 |
| $\beta_t$ | -0.004966 | -0.005768 | -0.000145 | -0.00126 | -0.000963 | -0.002799 | -0.001903 | -0.000641 |
| OLS SE | 0.004139 | 0.006065 | 0.00122 | 0.00194 | 0.001323 | 0.002056 | 0.004034 | 0.004929 |
| HET SE | 0.00513 | 0.007078 | 0.00196 | 0.002553 | 0.002133 | 0.002749 | 0.005242 | 0.005328 |
| $\beta^1_{FL}$ | 1.028881 | 1.025681 | 1.023256 | 1.024563 | 1.035204 | 1.056025 | 1.095262 | 1.130204 |
| OLS SE | 0.030345 | 0.042494 | 0.015397 | 0.024802 | 0.014873 | 0.023657 | 0.032327 | 0.041544 |
| HET SE | 0.042092 | 0.056508 | 0.022705 | 0.029675 | 0.026455 | 0.034858 | 0.046152 | 0.041994 |
| $\beta^2_{FL}$ | 1.176755 | 1.197422 | 0.861046 | 1.159799 | 1.158254 | 1.220955 | 0.885002 | 0.934577 |
| OLS SE | 0.034819 | 0.048848 | 0.033926 | 0.036497 | 0.033314 | 0.050127 | 0.03259 | 0.037008 |
| HET SE | 0.045045 | 0.05903 | 0.049841 | 0.054071 | 0.040973 | 0.054683 | 0.049475 | 0.042797 |
| $\beta^3_{FL}$ | 0.946235 | 0.94776 | 1.086396 | 1.046918 | 0.900305 | 0.850547 | 1.077082 | 1.10035 |
| OLS SE | 0.034575 | 0.046733 | 0.019293 | 0.03199 | 0.045691 | 0.09875 | 0.030307 | 0.037475 |
| HET SE | 0.034505 | 0.039325 | 0.03717 | 0.055607 | 0.058823 | 0.089957 | 0.045951 | 0.047307 |
| Triple Threshold | Total | Total | Debt | Debt | FDI | FDI | FPI | FPI |
| Threshold 1 | 0.973211 | 0.761182 | 0.832957 | 0.774702 | 0.22671 | 0.055725 | 0.035209 | 0.013589 |
| Threshold 2 | 1.058066 | 1.058066 | 0.9174 | 0.9174 | 0.413596 | 0.423 | 0.064819 | 0.035209 |
| Threshold 3 | 1.927312 | 1.868297 | 1.401099 | 1.412609 | 0.528463 | 0.528463 | 0.08093 | 0.065085 |
| CImin | 0.341379 | 0.300654 | 1.138097 | 0.125577 | 0.055132 | 0.017849 | 0.008594 | 0.029116 |
| CImax | 0.973211 | 1.336437 | 1.605295 | 0.794695 | 1.26839 | 1.315356 | 0.599834 | 0.53047 |
| F | 11.985725 | 5.432536 | 9.42027 | 7.280141 | 12.048737 | 7.999638 | 15.538334 | 8.560893 |
| Boot Strap P | 0.183333 | 0.573333 | 0.153333 | 0.186667 | 0.123333 | 0.116667 | 0.173333 | 0.116667 |
| $\beta_t$ | -0.004346 | -0.004344 | -0.000936 | -0.002517 | 0.000992 | -0.000916 | 0.000207 | -0.003182 |
| OLS SE | 0.004107 | 0.006066 | 0.001222 | 0.001987 | 0.001437 | 0.002155 | 0.004026 | 0.004928 |
| HET SE | 0.00519 | 0.006936 | 0.001969 | 0.002697 | 0.00195 | 0.002887 | 0.005417 | 0.005444 |
| $\beta^1_{FL}$ | 1.033415 | 1.038732 | 1.031282 | 1.055873 | 1.032165 | 1.116755 | 1.080819 | 1.147336 |
| OLS SE | 0.030108 | 0.042671 | 0.015364 | 0.0274 | 0.014814 | 0.03227 | 0.032181 | 0.041337 |
| HET SE | 0.041582 | 0.055988 | 0.022988 | 0.033875 | 0.025667 | 0.044313 | 0.046322 | 0.042508 |
| $\beta^2_{FL}$ | 0.79299 | 0.945358 | 0.867477 | 0.960639 | 0.960825 | 1.022358 | 0.872455 | 1.022484 |
| OLS SE | 0.077835 | 0.055777 | 0.033634 | 0.034688 | 0.026523 | 0.026508 | 0.032383 | 0.045601 |
| HET SE | 0.18198 | 0.075011 | 0.049671 | 0.032095 | 0.033991 | 0.039123 | 0.052343 | 0.057248 |
| $\beta^3_{FL}$ | 1.171529 | 1.186641 | 1.145911 | 1.174839 | 1.12417 | 1.187508 | 1.190281 | 0.891986 |
| OLS SE | 0.034547 | 0.048822 | 0.023616 | 0.036734 | 0.034624 | 0.051267 | 0.042575 | 0.038841 |
| HET SE | 0.045307 | 0.058656 | 0.040779 | 0.055675 | 0.03817 | 0.057363 | 0.068449 | 0.050058 |
| $\beta^4_{FL}$ | 0.946137 | 0.940793 | 1.030382 | 1.058206 | 0.874508 | 0.824285 | 1.027862 | 1.115889 |
| OLS SE | 0.034269 | 0.046581 | 0.023146 | 0.032093 | 0.046066 | 0.09857 | 0.032714 | 0.037292 |
| HET SE | 0.032854 | 0.039455 | 0.059307 | 0.052729 | 0.057514 | 0.091511 | 0.049917 | 0.048466 |
| Observations | 1035 | 575 | 1035 | 575 | 1035 | 575 | 1035 | 575 |

**Table B.4:** *Distribution of Emerging Economies for Total Liabilities in Full Sample*

| Emerging | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| country | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | |
| Argentina | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 1 | 1 | 1 | |
| Brazil | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| Chile | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | |
| China | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| Colombia | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| Ecuador | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | |
| Egypt | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| India | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| Indonesia | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 3 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| Israel | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | |
| Jordan | 1 | 1 | 2 | 2 | 2 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 2 | 2 | |
| Korea | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| Malaysia | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | |
| Mexico | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| Morocco | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| Pakistan | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| Peru | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| Philippines | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| Portugal | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | |
| Singapore | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| South Africa | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| Thailand | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| Turkey | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| Uruguay | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 1 | 1 | |
| Venezuela | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| Regime 1 | 19 | 19 | 19 | 20 | 20 | 22 | 21 | 22 | 21 | 22 | 22 | 22 | 23 | 19 | 17 | 19 | 19 | 18 | 18 | 17 | 20 | 20 | 20 | 459 |
| Regime 2 | 6 | 6 | 6 | 5 | 5 | 2 | 3 | 3 | 4 | 3 | 3 | 3 | 1 | 4 | 7 | 5 | 5 | 5 | 5 | 6 | 2 | 3 | 3 | 95 |
| Regime 3 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 1 | 1 | 1 | 2 | 2 | 2 | 3 | 2 | 2 | 21 |

**Table B.5:** *Distribution of Advanced Economies for Total Liabilities in Full Sample*

| Advanced | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| country | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | |
| Australia | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | |
| Austria | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | |
| Belium | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| Canada | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 2 | |
| Denmark | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 1 | 2 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 2 | 3 | 3 | |
| Finland | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 2 | 3 | 3 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | |
| France | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | |
| Germany | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | |
| Greece | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | |
| Iceland | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | |
| Ireland | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| Italy | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | |
| Japan | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| Netherlands | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| Norway | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 3 | |
| Spain | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | |
| Sweden | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | |
| Switzerland | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| United Kingdom | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| United States | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | |
| Regime 1 | 16 | 16 | 16 | 16 | 14 | 14 | 14 | 15 | 13 | 13 | 14 | 13 | 11 | 9 | 7 | 6 | 5 | 2 | 2 | 2 | 2 | 2 | 1 | 223 |
| Regime 2 | 4 | 4 | 4 | 4 | 5 | 5 | 5 | 5 | 5 | 5 | 3 | 3 | 5 | 6 | 7 | 8 | 9 | 12 | 9 | 7 | 8 | 6 | 6 | 135 |
| Regime 3 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 2 | 2 | 3 | 4 | 4 | 5 | 6 | 6 | 6 | 6 | 9 | 11 | 10 | 12 | 13 | 102 |

**Table B.6:** *Distribution of Emerging Economies for Debt Liabilities in Full Sample*

| Emerging | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| country | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | |
| Argentina | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 3 | 3 | 3 | 1 | 1 | 1 | |
| Brazil | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| Chile | 3 | 3 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| China | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| Colombia | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| Ecuador | 1 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 1 | 1 | 1 | 1 | 1 | 3 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| Egypt | 3 | 3 | 3 | 3 | 3 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| India | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| Indonesia | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 3 | 3 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | |
| Israel | 3 | 3 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| Jordan | 1 | 1 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | |
| Korea | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| Malaysia | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| Mexico | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| Morocco | 3 | 3 | 3 | 3 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| Pakistan | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| Peru | 1 | 2 | 1 | 3 | 3 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| Philippines | 2 | 3 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| Portugal | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| Singapore | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| South Africa | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| Thailand | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| Turkey | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| Uruguay | 3 | 2 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 3 | 3 | 2 | 1 | 1 | |
| Venezuela | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| Regime 1 | 18 | 17 | 18 | 20 | 18 | 22 | 22 | 23 | 23 | 24 | 24 | 24 | 23 | 20 | 20 | 20 | 21 | 21 | 21 | 21 | 22 | 23 | 23 | 488 |
| Regime2 | 2 | 3 | 2 | 1 | 3 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 3 | 2 | 1 | 0 | 0 | 1 | 0 | 0 | 23 |
| Regime 3 | 5 | 5 | 5 | 4 | 4 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 2 | 3 | 4 | 2 | 2 | 3 | 4 | 4 | 2 | 2 | 2 | 64 |

**Table B.7:** *Distribution of Advanced Economies for Debt Liabilities in Full Sample*

| Advanced | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| country | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | |
| Australia | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | |
| Austria | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| Belgium | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| Canada | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| Denmark | 3 | 2 | 3 | 2 | 3 | 3 | 3 | 2 | 3 | 1 | 1 | 1 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| Finland | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | |
| France | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| Germany | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| Greece | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 3 | 3 | 3 | 3 | 3 | 3 | |
| Iceland | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| Ireland | 3 | 2 | 3 | 2 | 3 | 3 | 2 | 1 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| Italy | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 3 | 3 | 3 | 3 | 3 | |
| Japan | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| Netherlands | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| Norway | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 3 | 3 | 3 | 2 | 3 | 3 | |
| Spain | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 3 | 3 | 3 | 3 | 3 | 3 | |
| Sweden | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 1 | 1 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | |
| Switzerland | 3 | 3 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| United Kingdom | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| United States | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 3 | |
| Regime 1 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 16 | 13 | 14 | 15 | 15 | 14 | 12 | 12 | 9 | 8 | 4 | 4 | 4 | 4 | 4 | 2 | 255 |
| Regime 2 | 0 | 2 | 0 | 3 | 0 | 0 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 2 | 22 |
| Regime 3 | 5 | 3 | 5 | 2 | 5 | 5 | 4 | 3 | 5 | 4 | 4 | 4 | 5 | 7 | 7 | 10 | 11 | 15 | 16 | 16 | 15 | 16 | 16 | 183 |

**Table B.8:** *Distribution of Emerging Economies for FDI Liabilities in Full Sample*

| Emerging | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| country | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | |
| Argentina | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | |
| Brazil | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| Chile | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| China | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| Colombia | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| Ecuador | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| Egypt | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| India | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| Indonesia | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| Israel | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| Jordan | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 3 | 3 | 3 | 3 | |
| Korea | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| Malaysia | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | |
| Mexico | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| Morocco | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | |
| Pakistan | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| Peru | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| Philippines | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| Portugal | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | |
| Singapore | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| South Africa | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| Thailand | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| Turkey | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| Uruguay | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| Venezuela | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| Regime 1 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 23 | 23 | 23 | 24 | 22 | 22 | 21 | 22 | 20 | 21 | 21 | 21 | 19 | 19 | 517 |
| Regime 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 2 | 1 | 2 | 1 | 3 | 2 | 1 | 1 | 3 | 0 | 22 |
| Regime 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 6 | 36 |

**Table B.9:** *Distribution of Advanced Economies for FDI Liabilities in Full Sample*

| Advanced | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| country | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | |
| Australia | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | |
| Austria | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 3 | 3 | |
| Belgium | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 2 | 2 | 3 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| Canada | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| Denmark | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 3 | 2 | 2 | 2 | 2 | 1 | 1 | 2 | |
| Finland | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| France | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 3 | 3 | |
| Germany | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| Greece | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| Iceland | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 3 | |
| Ireland | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| Italy | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| Japan | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| Netherlands | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| Norway | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| Spain | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | |
| Sweden | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 3 | 2 | 3 | 3 | |
| Switzerland | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 3 | 3 | 2 | 3 | 3 | |
| United Kingdom | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | |
| United States | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| Regime 1 | 19 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 18 | 18 | 19 | 18 | 18 | 18 | 17 | 16 | 16 | 14 | 12 | 12 | 13 | 11 | 9 | 388 |
| Regime 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 1 | 2 | 2 | | 1 | 1 | 1 | 3 | 4 | 3 | 4 | 2 | 3 | 32 |
| Regime 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 3 | 3 | 3 | 4 | 5 | 3 | 7 | 8 | 40 |

**Table B.10:** *Distribution of Emerging Economies for FPI Liabilities in Full Sample*

| Emerging | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| country | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | |
| Argentina | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 3 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| Brazil | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 2 | 3 | 2 | 3 | 3 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | |
| Chile | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | |
| China | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 3 | 3 | |
| Colombia | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 2 | |
| Ecuador | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| Egypt | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| India | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | |
| Indonesia | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 2 | 3 | 2 | 2 | 1 | 2 | 2 | 2 | 3 | 3 | |
| Israel | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| Jordan | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| Korea | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 1 | 1 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| Malaysia | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| Mexico | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| Morocco | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | |
| Pakistan | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | |
| Peru | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | |
| Philippines | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 3 | 3 | 3 | 3 | 2 | 3 | 3 | 2 | 2 | 1 | 2 | 2 | 3 | 3 | 3 | |
| Portugal | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| Singapore | 1 | 2 | 1 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| S. Africa | 1 | 2 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| Thailand | 1 | 1 | 1 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| Turkey | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 2 | 3 | 2 | 3 | |
| Uruguay | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| Venezuela | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 3 | 3 | 2 | 2 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | |
| Regime 1 | 23 | 22 | 24 | 22 | 22 | 22 | 19 | 19 | 15 | 12 | 15 | 11 | 12 | 10 | 10 | 10 | 10 | 13 | 9 | 8 | 7 | 6 | 5 | 326 |
| Regime 2 | 2 | 3 | 1 | 3 | 1 | 1 | 4 | 2 | 4 | 6 | 3 | 5 | 3 | 5 | 3 | 5 | 5 | 3 | 5 | 6 | 4 | 4 | 4 | 82 |
| Regime 3 | 0 | 0 | 0 | 0 | 2 | 2 | 2 | 4 | 6 | 7 | 7 | 9 | 10 | 10 | 12 | 10 | 10 | 9 | 11 | 11 | 14 | 15 | 16 | 167 |

**Table B.11:** *Distribution of Advanced Economies for FPI Liabilities in Full Sample*

| Advanced | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| country | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | |
| Australia | 2 | 3 | 3 | 3 | 2 | 2 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| Austria | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| Belgium | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 3 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| Canada | 2 | 2 | 2 | 2 | 3 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| Denmark | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| Finland | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| France | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| Germany | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| Greece | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 3 | 3 | 3 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | |
| Iceland | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 3 | 3 | 3 | |
| Ireland | 1 | 1 | 1 | 1 | 1 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| Italy | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| Japan | 1 | 2 | 1 | 2 | 2 | 1 | 2 | 1 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| Netherlands | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| Norway | 1 | 1 | 1 | 2 | 3 | 3 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| Spain | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| Sweden | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| Switzerland | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| United Kingdom | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| United States | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| Regime 1 | 13 | 12 | 14 | 11 | 10 | 9 | 7 | 10 | 5 | 4 | 3 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 107 |
| Regime 2 | 4 | 4 | 2 | 5 | 5 | 7 | 8 | 6 | 6 | 6 | 6 | 5 | 2 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 71 |
| Regime 3 | 3 | 4 | 4 | 4 | 5 | 4 | 5 | 4 | 9 | 10 | 11 | 13 | 17 | 19 | 18 | 18 | 18 | 18 | 19 | 19 | 20 | 20 | 20 | 282 |

APPENDIX C

# APPENDIX CHAPTER 3 A

**Table C.1:** *Data Source*

Data Source

| Variable | Source |
|---|---|
| Stock of External Liabilities | EWN II |
| Stock of External Assets | EWN II |
| Stock of FDI liabilities | EWN II |
| Stock of Equity Liabilities | EWN II |
| Stock of External Debt Liabilities | World Bank |
| Stock of FDI Assets | EWN II |
| Stock of Equity Assets | EWN II |
| Stock of External Debt Asssets | EWN II |
| GDP | WDI-WB |
| Anti-Corruption | World Bank |
| Capital Openness | Chinn-Ito |
| Government Expenditure | WDI |
| Capital Formation | WDI |
| Import and Export | UNCTAD |
| Financial openness | Trilema |
| Exchange Rate | Trilema |
| M2 % of GDP | Trilema |
| Crisis Dates | RR |

Notes: WDI-WB: World Development Indicators-World Bank ;
EWNII: Updated External Wealth of Nations ;
UNCTAD: United Nations Conference on Trade and Development;
RR: Reinhart and Rogoff Financial Crash to Debt Crisis dataset
All data from EWN II, WDI and UNCTAD is in current price US dollar.

**Table C.2:** *Summary statistics*

Summary Statistics

| Variable | Mean | Std. Dev. | N |
|---|---|---|---|
| $Log(\frac{TotalAssets}{GDP})$ | -2.214 | 1.099 | 1083 |
| $Log(\frac{FX}{GDP})$ | -2.565 | 1.077 | 1122 |
| $Log(\frac{FDI}{GDP})$ | -4.459 | 1.759 | 957 |
| $Log(\frac{FX}{GDP})$ | -5.282 | 1.989 | 841 |
| $Log(\frac{Debt}{GDP})$ | -2.927 | 0.871 | 831 |
| $\log(\frac{GDP}{capita})$ | 3693.408 | 4493.335 | 1123 |
| ER Regime | 2.398 | 1.164 | 1051 |
| ER Volatility | 1.329 | 30.812 | 1036 |
| $Log(\frac{M2}{GDP})$ | 3.626 | 0.583 | 1087 |
| K Open | -0.059 | 1.463 | 1066 |
| $Log(\frac{Trade}{GDP})$ | -0.848 | 0.731 | 1113 |
| Anti-Corrupt | 3.048 | 1.198 | 1005 |
| Crisis Events | 0.114 | 0.318 | 1151 |
| Year Dummy | 0.568 | 0.496 | 1151 |
| CA Surplus | -33.017 | 15146.127 | 1151 |
| Year*$Log(\frac{Debt}{GDP})$ | -1.583 | 1.566 | 831 |
| Year*$Log(\frac{M2}{GDP})$ | 2.177 | 1.906 | 1087 |

**Table C.3:** *Notes*

Notes for Regression tables

| Notes | Explanations |
|---|---|
| Robust standard errors | Presented in parentheses |
| *** | p<0.01 |
| ** | p<0.05 |
| * | p<0.1 |
| Specification I | Based on the sample from 1970-2007 |
| Specification II | Based on the sample from 1990-2007 |
| Specification III | Based on a sample from 1970-2007 with a year dummy and interaction term with debt variable |
| Specification IV | Based on a sample from 1970-2007 with a year dummy and interaction term with M2 variable |
| Table C | Detrended |
| Table C.4 - Table C.7 | Emerging Economies - Non IV specification |
| Table C.8 - Table C.11 | Emerging Economies - Trade agreements substituted for trade |
| Table C.12 - Table C.15 | Emerging Economies - First stage regression results |
| Table C.16 - Table C.19 | Emerging Economies - IV specification |
| Table D | Non-Detrended |
| Table D.1 - Table D.4 | Emerging Economies - Non IV specification |
| Table D.5 - Table D.8 | Emerging Economies - Trade agreements substituted for trade |
| Table D.9 - Table D.12 | Emerging Economies - First stage regression results |
| Table D.13 - Table D.16 | Emerging Economies - IV specification |
| Table E | Advanced |
| Table E.2 - Table E.5 | Advanced Economies - Non IV specification |
| Table E.6 - Table E.9 | Advanced Economies - IV specification |
| Table F | Comparisons |
| Table F.1 - Table F.4 | Emerging Economies Detrended and Non-Detrended - Comparison tables |
| Table F.5 - Table F.8 | Emerging and Advanced Economies - Comparison tables |

**Table C.4:** *Emerging Economies: Total Assets*

Emerging Economies: Total Assets

| VARIABLES | (I) $\log(\frac{TotalAssets}{GDP})$ | (II) $\log(\frac{TotalAssets}{GDP})$ | (III) $\log(\frac{TotalAssets}{GDP})$ | (IV) $\log(\frac{TotalAssets}{GDP})$ |
|---|---|---|---|---|
| $\log(\frac{Debt}{GDP})$ | -0.237** | 0.0617 | -0.324*** | -0.237*** |
| | (0.0853) | (0.0839) | (0.0777) | (0.0803) |
| $Year * \log(\frac{Debt}{GDP})$ | | | 0.171** | |
| | | | (0.0718) | |
| $\log(\frac{GDP}{Capita})$ | -6.99e-06 | -4.15e-05 | -2.57e-05 | -1.69e-05 |
| | (3.52e-05) | (3.18e-05) | (3.67e-05) | (3.39e-05) |
| ER Regime | 0.0448 | 0.0359 | 0.0420 | 0.0422 |
| | (0.0593) | (0.0654) | (0.0534) | (0.0545) |
| ER Volatility | -0.000314*** | -0.00715* | -0.000464*** | -0.000454*** |
| | (9.98e-05) | (0.00364) | (0.000120) | (0.000140) |
| $\log(\frac{M2}{GDP})$ | 0.646*** | 0.489*** | 0.685*** | 0.659** |
| | (0.209) | (0.165) | (0.207) | (0.276) |
| K Open | 0.0663* | -0.0348 | 0.0666* | 0.0643* |
| | (0.0342) | (0.0306) | (0.0327) | (0.0359) |
| Anti-Corruption | -0.0969* | 0.0298 | -0.140** | -0.125** |
| | (0.0502) | (0.0564) | (0.0527) | (0.0533) |
| Crisis Events | -0.203** | -0.157** | -0.199*** | -0.199*** |
| | (0.0760) | (0.0694) | (0.0665) | (0.0657) |
| Year | -0.0208 | | -0.0423** | -0.0420** |
| | (0.0135) | | (0.0177) | (0.0173) |
| $\log(\frac{Trade}{GDP})$ | 0.638** | 0.617** | 0.613** | 0.625*** |
| | (0.238) | (0.234) | (0.227) | (0.218) |
| Year Dummy | | | 0.346** | 0.415** |
| | | | (0.153) | (0.171) |
| Year 1990-2007 | | -0.00437 | | |
| | | (0.0146) | | |
| $Year * \log(\frac{M2}{GDP})$ | | | | 0.0571 |
| | | | | (0.228) |
| Constant | 0.488* | -0.669** | 0.765*** | 0.736** |
| | (0.262) | (0.271) | (0.237) | (0.271) |
| Observations | 639 | 361 | 639 | 639 |
| R-squared | 0.246 | 0.282 | 0.289 | 0.278 |
| Number of countries | 26 | 26 | 26 | 26 |

**Table C.5:** *Emerging Economies: FX*

Emerging Economies: FX

| VARIABLES | (I) $\log(\frac{FX}{GDP})$ | (II) $\log(\frac{FX}{GDP})$ | (III) $\log(\frac{FX}{GDP})$ | (IV) $\log(\frac{FX}{GDP})$ |
|---|---|---|---|---|
| $\log(\frac{Debt}{GDP})$ | -0.284*** | -0.0127 | -0.321*** | -0.274*** |
| | (0.0822) | (0.0961) | (0.0813) | (0.0759) |
| $Year * \log(\frac{Debt}{GDP})$ | | | 0.0822 | |
| | | | (0.0805) | |
| $\log(\frac{GDP}{Capita})$ | -3.25e-05 | -2.60e-05 | -4.87e-05 | -3.88e-05 |
| | (2.98e-05) | (4.22e-05) | (3.20e-05) | (2.93e-05) |
| ER Regime | -0.0219 | 0.0138 | -0.0223 | -0.0170 |
| | (0.0752) | (0.0742) | (0.0695) | (0.0684) |
| ER Volatility | -0.000281*** | -0.00889 | -0.000439*** | -0.000467*** |
| | (9.90e-05) | (0.00722) | (0.000116) | (0.000129) |
| $\log(\frac{M2}{GDP})$ | 0.651*** | 0.392* | 0.697*** | 0.612** |
| | (0.171) | (0.227) | (0.176) | (0.243) |
| K Open | 0.0541 | -0.0658 | 0.0485 | 0.0506 |
| | (0.0421) | (0.0415) | (0.0417) | (0.0448) |
| Anti-Corruption | -0.0795 | -0.0292 | -0.123* | -0.114* |
| | (0.0630) | (0.0706) | (0.0642) | (0.0648) |
| Crisis Events | -0.288*** | -0.175* | -0.279*** | -0.276*** |
| | (0.0975) | (0.0865) | (0.0902) | (0.0879) |
| Year | -0.000455 | | -0.0276* | -0.0257* |
| | (0.0100) | | (0.0146) | (0.0143) |
| $\log(\frac{Trade}{GDP})$ | 0.659** | 0.633** | 0.646*** | 0.652*** |
| | (0.240) | (0.285) | (0.230) | (0.214) |
| Year Dummy | | | 0.503*** | 0.549*** |
| | | | (0.178) | (0.188) |
| Year 1990-2007 | | 0.0189 | | |
| | | (0.0191) | | |
| $Year * \log(\frac{M2}{GDP})$ | | | | 0.138 |
| | | | | (0.251) |
| Constant | 0.483 | 0.113 | 0.805*** | 0.765** |
| | (0.286) | (0.340) | (0.255) | (0.287) |
| Observations | 675 | 373 | 675 | 675 |
| R-squared | 0.274 | 0.279 | 0.318 | 0.319 |
| Number of countries | 26 | 26 | 26 | 26 |

**Table C.6:** *Emerging Economies: FDI*

Emerging Economies: FDI

| VARIABLES | (I) $\log(\frac{FDI}{GDP})$ | (II) $\log(\frac{FDI}{GDP})$ | (III) $\log(\frac{FDI}{GDP})$ | (IV) $\log(\frac{FDI}{GDP})$ |
|---|---|---|---|---|
| $\log(\frac{Debt}{GDP})$ | -0.188 | -0.0299 | -0.425** | -0.197 |
| | (0.133) | (0.0934) | (0.196) | (0.135) |
| $Year * \log(\frac{Debt}{GDP})$ | | | 0.381* | |
| | | | (0.217) | |
| $\log(\frac{GDP}{Capita})$ | 0.000203 | 6.88e-05 | 0.000184 | 0.000170 |
| | (0.000128) | (5.30e-05) | (0.000130) | (0.000117) |
| ER Regime | 0.240*** | 0.126* | 0.222** | 0.229*** |
| | (0.0832) | (0.0707) | (0.0814) | (0.0775) |
| ER Volatility | -0.0131 | 0.00403 | -0.0128 | -0.00920 |
| | (0.0117) | (0.00435) | (0.0103) | (0.00869) |
| $\log(\frac{M2}{GDP})$ | 0.349 | 0.983*** | 0.353 | 0.907* |
| | (0.496) | (0.308) | (0.471) | (0.508) |
| K Open | -0.183* | -0.0988 | -0.185* | -0.201** |
| | (0.0947) | (0.0618) | (0.0962) | (0.0861) |
| Anti-Corruption | -0.0340 | 0.100 | -0.0565 | -0.0474 |
| | (0.107) | (0.0813) | (0.116) | (0.106) |
| Crisis Events | 0.169 | 0.162 | 0.181 | 0.153 |
| | (0.127) | (0.102) | (0.124) | (0.112) |
| Year | 0.0755 | | 0.0717 | 0.0647 |
| | (0.0536) | | (0.0516) | (0.0472) |
| $\log(\frac{Trade}{GDP})$ | 1.303*** | 0.787* | 1.273*** | 1.186** |
| | (0.429) | (0.427) | (0.442) | (0.464) |
| Year Dummy | | | -0.0500 | -0.0711 |
| | | | (0.153) | (0.163) |
| Year 1990-2007 | | 0.0409 | | |
| | | (0.0307) | | |
| $Year * \log(\frac{M2}{GDP})$ | | | | -0.703** |
| | | | | (0.321) |
| Constant | -1.675** | -1.032 | -1.570** | -1.584** |
| | (0.712) | (0.627) | (0.640) | (0.655) |
| Observations | 558 | 366 | 558 | 558 |
| R-squared | 0.245 | 0.278 | 0.273 | 0.287 |
| Number of countries | 26 | 26 | 26 | 26 |

**Table C.7:** *Emerging Economies: FPI*

Emerging Economies: FPI

| VARIABLES | (I) $\log(\frac{FPI}{GDP})$ | (II) $\log(\frac{FPI}{GDP})$ | (III) $\log(\frac{FPI}{GDP})$ | (IV) $\log(\frac{FPI}{GDP})$ |
|---|---|---|---|---|
| $\log(\frac{Debt}{GDP})$ | -0.0237 | -0.0648 | 0.200 | -0.0375 |
| | (0.169) | (0.156) | (0.196) | (0.158) |
| $Year * \log(\frac{Debt}{GDP})$ | | | -0.366** | |
| | | | (0.169) | |
| $\log(\frac{GDP}{Capita})$ | -0.000125* | -5.36e-05 | -0.000118 | -0.000122 |
| | (6.86e-05) | (7.19e-05) | (7.69e-05) | (7.72e-05) |
| ER Regime | -0.0382 | -0.00339 | -0.0342 | -0.0346 |
| | (0.0715) | (0.0618) | (0.0732) | (0.0779) |
| ER Volatility | 0.00130*** | 0.00882 | 0.00138*** | 0.00136*** |
| | (0.000366) | (0.00789) | (0.000360) | (0.000388) |
| $\log(\frac{M2}{GDP})$ | 0.277 | 0.825** | 0.302 | 0.576** |
| | (0.332) | (0.324) | (0.305) | (0.263) |
| K Open | 0.142* | 0.114 | 0.133* | 0.115* |
| | (0.0736) | (0.0754) | (0.0713) | (0.0616) |
| Anti-Corruption | -0.102 | -0.0676 | -0.0734 | -0.126 |
| | (0.0922) | (0.101) | (0.0972) | (0.0984) |
| Crisis Events | -0.0862 | 0.0460 | -0.102 | -0.0854 |
| | (0.109) | (0.133) | (0.104) | (0.105) |
| Year | -0.0693** | | -0.0726* | -0.0717* |
| | (0.0313) | | (0.0375) | (0.0390) |
| $\log(\frac{Trade}{GDP})$ | 0.371 | 0.425 | 0.427 | 0.440 |
| | (0.290) | (0.402) | (0.295) | (0.315) |
| Year Dummy | | | 0.128 | -0.0747 |
| | | | (0.245) | (0.324) |
| Year 1990-2007 | | -0.0571* | | |
| | | (0.0310) | | |
| $Year * \log(\frac{M2}{GDP})$ | | | | -0.405 |
| | | | | (0.427) |
| Constant | 0.355 | -0.645 | 0.325 | 0.571 |
| | (0.592) | (0.650) | (0.683) | (0.699) |
| Observations | 468 | 325 | 468 | 468 |
| R-squared | 0.122 | 0.130 | 0.150 | 0.136 |
| Number of countries | 26 | 26 | 26 | 26 |

**Table C.8:** *Emerging Economies: Trade Agreements and Total Assets*

Emerging Economies: Trade Agreements and Total Assets

| VARIABLES | (I) $\log(\frac{TotalAssets}{GDP})$ | (II) $\log(\frac{TotalAssets}{GDP})$ | (III) $\log(\frac{TotalAssets}{GDP})$ | (IV) $\log(\frac{TotalAssets}{GDP})$ |
|---|---|---|---|---|
| $\log(\frac{Debt}{GDP})$ | -0.205** | 0.0873 | -0.301*** | -0.206*** |
| | (0.0778) | (0.0820) | (0.0667) | (0.0732) |
| $Year * \log(\frac{Debt}{GDP})$ | | | 0.186*** | |
| | | | (0.0647) | |
| $\log(\frac{GDP}{capita})$ | -2.45e-05 | -7.83e-05** | -4.32e-05 | -3.54e-05 |
| | (3.25e-05) | (3.05e-05) | (3.44e-05) | (3.50e-05) |
| ER Regime | 0.0617 | 0.0632 | 0.0584 | 0.0592 |
| | (0.0484) | (0.0606) | (0.0438) | (0.0453) |
| ER Volatility | -0.000454*** | -0.00786** | -0.000601*** | -0.000579*** |
| | (0.000132) | (0.00318) | (0.000145) | (0.000156) |
| $\log(\frac{M2}{GDP})$ | 0.707*** | 0.606*** | 0.742*** | 0.743*** |
| | (0.194) | (0.170) | (0.192) | (0.256) |
| K Open | 0.0607 | -0.0462 | 0.0614 | 0.0573 |
| | (0.0407) | (0.0321) | (0.0390) | (0.0408) |
| Anti-Corruption | -0.140*** | 0.0258 | -0.183*** | -0.169*** |
| | (0.0494) | (0.0617) | (0.0492) | (0.0523) |
| Crisis Events | -0.183** | -0.155** | -0.180** | -0.181** |
| | (0.0755) | (0.0729) | (0.0649) | (0.0659) |
| Year | -0.0302* | | -0.0514** | -0.0515** |
| | (0.0159) | | (0.0203) | (0.0203) |
| Trade Agreements | 0.0653** | 0.0260 | 0.0624** | 0.0609** |
| | (0.0260) | (0.0223) | (0.0284) | (0.0273) |
| Year Dummy | | | 0.344** | 0.413** |
| | | | (0.148) | (0.159) |
| Year 1990-2007 | | -0.0112 | | |
| | | (0.0177) | | |
| $Year * \log(\frac{M2}{GDP})$ | | | | 0.0231 |
| | | | | (0.194) |
| Constant | 0.394* | -1.168*** | 0.678*** | 0.655** |
| | (0.228) | (0.296) | (0.234) | (0.259) |
| Observations | 639 | 361 | 639 | 639 |
| R-squared | 0.653 | 0.810 | 0.674 | 0.672 |
| Number of countries | 26 | 26 | 26 | 26 |

**Table C.9:** *Emerging Economies: Trade Agreements and FX*

Emerging Economies: Trade Agreements and FX

| VARIABLES | (I) $\log(\frac{FX}{GDP})$ | (II) $\log(\frac{FX}{GDP})$ | (III) $\log(\frac{FX}{GDP})$ | (IV) $\log(\frac{FX}{GDP})$ |
|---|---|---|---|---|
| $\log(\frac{Debt}{GDP})$ | -0.249*** | 0.00805 | -0.289*** | -0.241*** |
| | (0.0758) | (0.0929) | (0.0733) | (0.0703) |
| $Year * \log(\frac{Debt}{GDP})$ | | | 0.0856 | |
| | | | (0.0745) | |
| $\log(\frac{GDP}{capita})$ | -4.19e-05 | -6.58e-05 | -5.71e-05* | -4.83e-05 |
| | (2.81e-05) | (4.05e-05) | (3.31e-05) | (3.41e-05) |
| ER Regime | 0.00197 | 0.0392 | 0.00194 | 0.00750 |
| | (0.0638) | (0.0687) | (0.0591) | (0.0582) |
| ER Volatility | -0.000402*** | -0.00972 | -0.000548*** | -0.000567*** |
| | (0.000138) | (0.00662) | (0.000162) | (0.000160) |
| $\log(\frac{M2}{GDP})$ | 0.691*** | 0.515** | 0.739*** | 0.673*** |
| | (0.176) | (0.227) | (0.184) | (0.233) |
| K Open | 0.0408 | -0.0736* | 0.0343 | 0.0352 |
| | (0.0511) | (0.0431) | (0.0518) | (0.0527) |
| Anti-Corruption | -0.122* | -0.0353 | -0.166** | -0.159** |
| | (0.0604) | (0.0741) | (0.0599) | (0.0621) |
| Crisis Events | -0.263** | -0.168* | -0.257*** | -0.255*** |
| | (0.0967) | (0.0891) | (0.0899) | (0.0880) |
| Year | -0.00660 | | -0.0325 | -0.0308 |
| | (0.0130) | | (0.0194) | (0.0195) |
| Trade Agreements | 0.0717*** | 0.0376 | 0.0648** | 0.0636** |
| | (0.0254) | (0.0259) | (0.0277) | (0.0285) |
| Year Dummy | | | 0.495** | 0.539*** |
| | | | (0.181) | (0.183) |
| Year 1990-2007 | | 0.00865 | | |
| | | (0.0214) | | |
| $Year * \log(\frac{M2}{GDP})$ | | | | 0.110 |
| | | | | (0.221) |
| Constant | 0.334 | -0.400 | 0.652** | 0.616** |
| | (0.244) | (0.368) | (0.260) | (0.280) |
| Observations | 675 | 373 | 675 | 675 |
| R-squared | 0.591 | 0.723 | 0.623 | 0.626 |
| Number of countries | 26 | 26 | 26 | 26 |

**Table C.10:** *Emerging Economies: Trade Agreements and FDI*

Emerging Economies: Trade Agreements and FDI

| VARIABLES | (I) $\log(\frac{FDI}{GDP})$ | (II) $\log(\frac{FDI}{GDP})$ | (III) $\log(\frac{FDI}{GDP})$ | (IV) $\log(\frac{FDI}{GDP})$ |
|---|---|---|---|---|
| $\log(\frac{Debt}{GDP})$ | -0.131 | -0.00237 | -0.390** | -0.150 |
| | (0.141) | (0.0958) | (0.177) | (0.136) |
| $Year * \log(\frac{Debt}{GDP})$ | | | 0.408* | |
| | | | (0.209) | |
| $\log(\frac{GDP}{capita})$ | 0.000152 | 2.18e-05 | 0.000130 | 0.000113 |
| | (0.000132) | (5.94e-05) | (0.000134) | (0.000120) |
| ER Regime | 0.261*** | 0.161** | 0.240*** | 0.242*** |
| | (0.0863) | (0.0675) | (0.0855) | (0.0763) |
| ER Volatility | -0.0160 | 0.00317 | -0.0157 | -0.0114 |
| | (0.0119) | (0.00475) | (0.0104) | (0.00875) |
| $\log(\frac{M2}{GDP})$ | 0.583 | 1.134*** | 0.588 | 1.209** |
| | (0.518) | (0.344) | (0.490) | (0.516) |
| K Open | -0.203** | -0.112* | -0.204* | -0.219** |
| | (0.0985) | (0.0607) | (0.100) | (0.0883) |
| Anti-Corruption | -0.109 | 0.0938 | -0.136 | -0.119 |
| | (0.110) | (0.0852) | (0.111) | (0.0984) |
| Crisis Events | 0.173 | 0.167 | 0.186 | 0.158 |
| | (0.139) | (0.101) | (0.135) | (0.125) |
| Year | 0.0559 | | 0.0477 | 0.0391 |
| | (0.0578) | | (0.0569) | (0.0517) |
| Trade Agreements | 0.0835 | 0.0347 | 0.0866 | 0.0916* |
| | (0.0557) | (0.0425) | (0.0573) | (0.0531) |
| Year Dummy | | | 0.00171 | -0.0348 |
| | | | (0.156) | (0.169) |
| Year 1990-2007 | | 0.0315 | | |
| | | (0.0326) | | |
| $Year * \log(\frac{M2}{GDP})$ | | | | -0.821*** |
| | | | | (0.281) |
| Constant | -1.854** | -1.669*** | -1.678** | -1.662** |
| | (0.759) | (0.535) | (0.689) | (0.708) |
| Observations | 558 | 366 | 558 | 558 |
| R-squared | 0.710 | 0.865 | 0.718 | 0.720 |
| Number of countries | 26 | 26 | 26 | 26 |

**Table C.11:** *Emerging Economies: Trade Agreements and FPI*

Emerging Economies: Trade Agreements and FPI

| VARIABLES | (I) $\log(\frac{FPI}{GDP})$ | (II) $\log(\frac{FPI}{GDP})$ | (III) $\log(\frac{FPI}{GDP})$ | (IV) $\log(\frac{FPI}{GDP})$ |
|---|---|---|---|---|
| $\log(\frac{Debt}{GDP})$ | -0.0208 | -0.0506 | 0.190 | -0.0345 |
| | (0.172) | (0.165) | (0.190) | (0.163) |
| $Year * \log(\frac{Debt}{GDP})$ | | | -0.345** | |
| | | | (0.162) | |
| $\log(\frac{GDP}{capita})$ | -0.000136** | -7.65e-05 | -0.000132* | -0.000137* |
| | (6.43e-05) | (6.99e-05) | (7.17e-05) | (7.13e-05) |
| ER Regime | -0.0219 | 0.0205 | -0.0164 | -0.0177 |
| | (0.0726) | (0.0642) | (0.0734) | (0.0786) |
| ER Volatility | 0.00129*** | 0.00894 | 0.00136*** | 0.00133*** |
| | (0.000393) | (0.00779) | (0.000394) | (0.000420) |
| $\log(\frac{M2}{GDP})$ | 0.320 | 0.905*** | 0.353 | 0.591* |
| | (0.331) | (0.305) | (0.304) | (0.287) |
| K Open | 0.141* | 0.105 | 0.132* | 0.117* |
| | (0.0743) | (0.0750) | (0.0724) | (0.0617) |
| Anti-Corruption | -0.118 | -0.0708 | -0.0951 | -0.143 |
| | (0.0873) | (0.0977) | (0.0970) | (0.0961) |
| Crisis Events | -0.0834 | 0.0428 | -0.0990 | -0.0810 |
| | (0.108) | (0.133) | (0.103) | (0.104) |
| Year | -0.0699** | | -0.0742* | -0.0745* |
| | (0.0312) | | (0.0382) | (0.0389) |
| Trade Agreements | 0.00782 | 0.00101 | 0.00798 | 0.0135 |
| | (0.0309) | (0.0517) | (0.0318) | (0.0346) |
| Year Dummy | | | 0.141 | -0.0407 |
| | | | (0.251) | (0.328) |
| Year 1990-2007 | | -0.0575 | | |
| | | (0.0366) | | |
| $Year * \log(\frac{M2}{GDP})$ | | | | -0.355 |
| | | | | (0.422) |
| Constant | 0.183 | -0.981* | 0.148 | 0.376 |
| | (0.633) | (0.517) | (0.702) | (0.710) |
| Observations | 468 | 325 | 468 | 468 |
| R-squared | 0.842 | 0.889 | 0.847 | 0.845 |
| Number of countries | 26 | 26 | 26 | 26 |

**Table C.12:** *Summary results for first-stage regressions*

Effect on FPI

| Variable | Shea Partial R2 | Partial R2 | F( 1, 25) | P-value |
|---|---|---|---|---|
| $log(\frac{Trade}{GDP})$ | 0.0845 | 0.0845 | 19.17 | 0.0002 |

**Table C.13:** *Underidentification tests*

Underidentification tests

| Tests | Chi-sq(1) | P-val |
|---|---|---|
| Kleibergen-Paap rk LM statistic | Chi-sq(1)=9.56 | P-val=0.002 |
| Kleibergen-Paap rk Wald statistic | Chi-sq(1)=21.09 | P-val=0.0000 |

Note: Ho: matrix of reduced form coefficients has rank=K1-1 (underidentified)
Ha: matrix has rank=K1 (identified)

**Table C.14:** *Underidentification tests*

Weak identification test

| Test | F statistics |
|---|---|
| Kleibergen-Paap Wald rk F statistic | 19.17 |

Ho: equation is weakly identified

**Table C.15:** *Weak-instrument-robust inference*

Weak identification test

| Tests | Statistics | P-val |
|---|---|---|
| Anderson-Rubin Wald test | F(1,25)= 6.05 | P-val=0.0211 |
| Anderson-Rubin Wald test | Chi-sq(1)=6.66 | P-val=0.0098 |

Tests of joint significance of endogenous regressors B1 in main equation
Ho: B1=0 and overidentifying restrictions are valid

**Table C.16:** *Emerging Economies:Instrument Variable and Total Assets*

Emerging Economies: Instrument Variable and Total Assets

| VARIABLES | (I) $\log(\frac{TotalAssets}{GDP})$ | (II) $\log(\frac{TotalAssets}{GDP})$ | (III) $\log(\frac{TotalAssets}{GDP})$ | (IV) $\log(\frac{TotalAssets}{GDP})$ |
|---|---|---|---|---|
| $\log(\frac{Trade}{GDP})$ | 1.224** | 1.275 | 1.169** | 1.134** |
| | (0.485) | (1.076) | (0.518) | (0.523) |
| $\log(\frac{Debt}{GDP})$ | -0.265*** | 0.0294 | -0.345*** | -0.260*** |
| | (0.0991) | (0.124) | (0.100) | (0.0901) |
| $Year * \log(\frac{Debt}{GDP})$ | | | 0.161* | |
| | | | (0.0829) | |
| $\log(\frac{GDP}{Capita})$ | 1.23e-06 | -8.22e-06 | -1.71e-05 | -8.58e-06 |
| | (4.17e-05) | (5.89e-05) | (4.16e-05) | (3.70e-05) |
| ER Regime | 0.0181 | -0.000543 | 0.0168 | 0.0192 |
| | (0.0640) | (0.0732) | (0.0588) | (0.0614) |
| ER Volatility | -0.000272*** | -0.00668* | -0.000417*** | -0.000417*** |
| | (0.000103) | (0.00406) | (0.000118) | (0.000139) |
| $\log(\frac{M2}{GDP})$ | 0.562** | 0.364 | 0.604*** | 0.573* |
| | (0.242) | (0.244) | (0.231) | (0.316) |
| K Open | 0.0863* | -0.0141 | 0.0855* | 0.0821* |
| | (0.0477) | (0.0351) | (0.0443) | (0.0473) |
| Anti-Corruption | -0.0470 | 0.0322 | -0.0906 | -0.0796 |
| | (0.0777) | (0.0508) | (0.0784) | (0.0777) |
| Crisis Events | -0.197*** | -0.146** | -0.194*** | -0.194*** |
| | (0.0703) | (0.0665) | (0.0612) | (0.0605) |
| Year | -0.0212 | | -0.0419** | -0.0412** |
| | (0.0171) | | (0.0197) | (0.0184) |
| Year Dummy | | | 0.334** | 0.403** |
| | | | (0.151) | (0.173) |
| Year 1990-2007 | | -0.00452 | | |
| | | (0.0147) | | |
| $Year * \log(\frac{M2}{GDP})$ | | | | 0.0748 |
| | | | | (0.259) |
| Constant | 1.295*** | 0.505 | 1.630*** | 1.574*** |
| | (0.226) | (0.547) | (0.200) | (0.227) |
| Observations | 639 | 361 | 639 | 639 |
| R-squared | 0.653 | 0.810 | 0.674 | 0.672 |
| Number of countries | 26 | 26 | 26 | 26 |

**Table C.17:** *Emerging Economies: Instrument Variable and FX*

Emerging Economies: Instrument Variable and FX

| VARIABLES | (I) $\log(\frac{FX}{GDP})$ | (II) $\log(\frac{FX}{GDP})$ | (III) $\log(\frac{FX}{GDP})$ | (IV) $\log(\frac{FX}{GDP})$ |
|---|---|---|---|---|
| $\log(\frac{Trade}{GDP})$ | 1.409*** | 1.732 | 1.275** | 1.243** |
| | (0.540) | (1.224) | (0.572) | (0.602) |
| $\log(\frac{Debt}{GDP})$ | -0.318*** | -0.0541 | -0.348*** | -0.300*** |
| | (0.0991) | (0.126) | (0.108) | (0.0872) |
| $Year * \log(\frac{Debt}{GDP})$ | | | 0.0804 | |
| | | | (0.0920) | |
| $\log(\frac{GDP}{Capita})$ | -3.23e-05 | 2.84e-05 | -4.82e-05 | -3.77e-05 |
| | (4.66e-05) | (7.63e-05) | (4.31e-05) | (3.75e-05) |
| ER Regime | -0.0647 | -0.0479 | -0.0582 | -0.0506 |
| | (0.0799) | (0.0931) | (0.0730) | (0.0755) |
| ER Volatility | -0.000253** | -0.00818 | -0.000412*** | -0.000446*** |
| | (0.000110) | (0.00770) | (0.000109) | (0.000129) |
| $\log(\frac{M2}{GDP})$ | 0.564*** | 0.176 | 0.624*** | 0.532* |
| | (0.203) | (0.315) | (0.192) | (0.284) |
| K Open | 0.0880 | -0.0331 | 0.0771 | 0.0779 |
| | (0.0600) | (0.0463) | (0.0563) | (0.0592) |
| Anti-Corruption | -0.0157 | -0.0196 | -0.0690 | -0.0629 |
| | (0.0965) | (0.0668) | (0.0927) | (0.0938) |
| Crisis Events | -0.284*** | -0.159* | -0.276*** | -0.273*** |
| | (0.0920) | (0.0831) | (0.0850) | (0.0829) |
| Year | -0.00525 | | -0.0311 | -0.0287 |
| | (0.0186) | | (0.0191) | (0.0179) |
| Year Dummy | | | 0.493*** | 0.542*** |
| | | | (0.169) | (0.188) |
| Year 1990-2007 | | 0.0201 | | |
| | | (0.0202) | | |
| $Year * \log(\frac{M2}{GDP})$ | | | | 0.153 |
| | | | | (0.280) |
| Constant | 1.357*** | 1.234** | 1.731*** | 1.672*** |
| | (0.320) | (0.620) | (0.268) | (0.295) |
| Observations | 675 | 373 | 675 | 675 |
| R-squared | 0.591 | 0.723 | 0.623 | 0.626 |
| Number of countries | 26 | 26 | 26 | 26 |

**Table C.18:** *Emerging Economies: Instrument Variable and FDI*

Emerging Economies: Instrument Variable and FDI

| VARIABLES | (I) $\log(\frac{FDI}{GDP})$ | (II) $\log(\frac{FDI}{GDP})$ | (III) $\log(\frac{FDI}{GDP})$ | (IV) $\log(\frac{FDI}{GDP})$ |
|---|---|---|---|---|
| $\log(\frac{Trade}{GDP})$ | 1.934* | 1.614 | 1.994* | 2.075* |
| | (1.151) | (1.885) | (1.163) | (1.073) |
| $\log(\frac{Debt}{GDP})$ | -0.216 | -0.0618 | -0.448** | -0.233 |
| | (0.143) | (0.116) | (0.216) | (0.149) |
| $Year * \log(\frac{Debt}{GDP})$ | | | 0.369 | |
| | | | (0.227) | |
| $\log(\frac{GDP}{Capita})$ | 0.000219* | 0.000110 | 0.000205* | 0.000197* |
| | (0.000120) | (8.72e-05) | (0.000121) | (0.000109) |
| ER Regime | 0.222** | 0.0792 | 0.203** | 0.206** |
| | (0.0894) | (0.135) | (0.0860) | (0.0842) |
| ER Volatility | -0.0122 | 0.00454 | -0.0118 | -0.00846 |
| | (0.0117) | (0.00439) | (0.0105) | (0.00908) |
| $\log(\frac{M2}{GDP})$ | 0.216 | 0.821* | 0.196 | 0.658 |
| | (0.555) | (0.427) | (0.540) | (0.613) |
| K Open | -0.163* | -0.0736 | -0.162* | -0.172* |
| | (0.0961) | (0.0602) | (0.0972) | (0.0929) |
| Anti-Corruption | 0.00796 | 0.106 | -0.00520 | 0.0154 |
| | (0.109) | (0.0770) | (0.120) | (0.112) |
| Crisis Events | 0.178 | 0.171* | 0.192 | 0.168 |
| | (0.126) | (0.104) | (0.123) | (0.114) |
| Year | 0.0777 | | 0.0761 | 0.0709 |
| | (0.0510) | | (0.0478) | (0.0438) |
| Year Dummy | | | -0.0770 | -0.0962 |
| | | | (0.165) | (0.174) |
| Year 1990-2007 | | 0.0412 | | |
| | | (0.0288) | | |
| $Year * \log(\frac{M2}{GDP})$ | | | | -0.628* |
| | | | | (0.354) |
| Constant | -0.881 | 1.404 | -0.733 | -0.820 |
| | (0.713) | (1.032) | (0.596) | (0.597) |
| Observations | 558 | 366 | 558 | 558 |
| R-squared | 0.710 | 0.865 | 0.718 | 0.720 |
| Number of countries | 26 | 26 | 26 | 26 |

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

**Table C.19:** *Emerging Economies: Instrument Variable and FPI*

Emerging Economies: Instrument Variable and FPI

| VARIABLES | (I) $\log(\frac{FPI}{GDP})$ | (II) $\log(\frac{FPI}{GDP})$ | (III) $\log(\frac{FPI}{GDP})$ | (IV) $\log(\frac{FPI}{GDP})$ |
|---|---|---|---|---|
| $\log(\frac{Trade}{GDP})$ | 0.193 | 0.0469 | 0.196 | 0.347 |
| | (0.735) | (2.320) | (0.756) | (0.855) |
| $\log(\frac{Debt}{GDP})$ | -0.0217 | -0.0520 | 0.196 | -0.0364 |
| | (0.166) | (0.202) | (0.190) | (0.156) |
| $Year * \log(\frac{Debt}{GDP})$ | | | -0.354** | |
| | | | (0.176) | |
| $\log(\frac{GDP}{Capita})$ | -0.000129** | -7.38e-05 | -0.000125* | -0.000125* |
| | (6.40e-05) | (0.000129) | (6.75e-05) | (7.46e-05) |
| ER Regime | -0.0297 | 0.0181 | -0.0239 | -0.0305 |
| | (0.0760) | (0.147) | (0.0774) | (0.0802) |
| ER Volatility | 0.00130*** | 0.00894 | 0.00138*** | 0.00136*** |
| | (0.000366) | (0.00751) | (0.000361) | (0.000380) |
| $\log(\frac{M2}{GDP})$ | 0.299 | 0.896* | 0.331 | 0.579** |
| | (0.362) | (0.491) | (0.339) | (0.255) |
| K Open | 0.141** | 0.106 | 0.132* | 0.115* |
| | (0.0716) | (0.0796) | (0.0692) | (0.0597) |
| Anti-Corruption | -0.110 | -0.0703 | -0.0854 | -0.130 |
| | (0.0925) | (0.0930) | (0.0994) | (0.0968) |
| Crisis Events | -0.0863 | 0.0428 | -0.102 | -0.0856 |
| | (0.106) | (0.128) | (0.102) | (0.102) |
| Year | -0.0689** | | -0.0726** | -0.0717* |
| | (0.0301) | | (0.0354) | (0.0373) |
| Year Dummy | | | 0.135 | -0.0672 |
| | | | (0.236) | (0.340) |
| Year 1990-2007 | | -0.0572* | | |
| | | (0.0300) | | |
| $Year * \log(\frac{M2}{GDP})$ | | | | -0.393 |
| | | | | (0.477) |
| Constant | 1.965*** | 1.084 | 1.872*** | 2.131*** |
| | (0.635) | (1.330) | (0.713) | (0.723) |
| Observations | 468 | 325 | 468 | 468 |
| R-squared | 0.842 | 0.889 | 0.847 | 0.845 |
| Number of countries | 26 | 26 | 26 | 26 |

APPENDIX D

# APPENDIX CHAPTER 3 B: NON-DETRENDED

**Table D.1:** *Emerging Economies:Total Assets*

Emerging Economies:Total Assets

| VARIABLES | (I) $Log(\frac{TotalAssets}{GDP})$ | (II) $Log(\frac{TotalAssets}{GDP})$ | (III) $Log(\frac{TotalAssets}{GDP})$ | (IV) $LOG(\frac{TotalAssets}{GDP})$ |
|---|---|---|---|---|
| $Log(\frac{Debt}{GDP})$ | -0.279** | -0.0513 | -0.324*** | -0.240*** |
| | (0.101) | (0.115) | (0.0747) | (0.0836) |
| Year*$Log(\frac{Debt}{GDP})$ | | | 0.152** | |
| | | | (0.0616) | |
| log($\frac{GDP}{capita}$) | 6.88e-05** | 2.97e-05 | -6.82e-06 | -1.47e-06 |
| | (2.93e-05) | (2.84e-05) | (3.36e-05) | (3.18e-05) |
| ER Regime | 0.112 | 0.0143 | 0.0620 | 0.0576 |
| | (0.0723) | (0.0603) | (0.0504) | (0.0539) |
| ER Volatility | -0.000435*** | -0.00594 | -0.000537*** | -0.000522*** |
| | (8.80e-05) | (0.00381) | (9.31e-05) | (0.000128) |
| $Log(\frac{M2}{GDP})$ | 0.823*** | 0.656*** | 0.751*** | 0.676** |
| | (0.223) | (0.185) | (0.209) | (0.277) |
| K Open | 0.0762 | 0.00578 | 0.0672* | 0.0655* |
| | (0.0446) | (0.0327) | (0.0354) | (0.0364) |
| $Log(\frac{Trade}{GDP})$ | 0.903*** | 1.268*** | 0.681*** | 0.674*** |
| | (0.229) | (0.230) | (0.233) | (0.222) |
| Anti-Corruption | -0.0832* | -0.0496 | -0.142*** | -0.124** |
| | (0.0468) | (0.0500) | (0.0500) | (0.0517) |
| Crisis Events | -0.181** | -0.128* | -0.193*** | -0.193*** |
| | (0.0820) | (0.0733) | (0.0666) | (0.0659) |
| Year Dummy | | | 0.915*** | 0.114 |
| | | | (0.241) | (0.753) |
| Year*$Log(\frac{M2}{GDP})$ | | | | 0.103 |
| | | | | (0.222) |
| Constant | -5.410*** | -3.394*** | -5.345*** | -4.897*** |
| | (1.256) | (0.843) | (1.091) | (1.156) |
| Observations | 639 | 361 | 639 | 639 |
| R-squared | 0.582 | 0.573 | 0.627 | 0.623 |
| Number of countries | 26 | 26 | 26 | 26 |

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

**Table D.2:** *Emerging Economies:FX*

Emerging Economies:FX

| VARIABLES | (I) $Log(\frac{FX}{GDP})$ | (II) $Log(\frac{FX}{GDP})$ | (III) $Log(\frac{FX}{GDP})$ | (IV) $Log(\frac{FX}{GDP})$ |
|---|---|---|---|---|
| $Log(\frac{Debt}{GDP})$ | -0.326*** | -0.0825 | -0.323*** | -0.269*** |
| | (0.0979) | (0.117) | (0.0775) | (0.0781) |
| Year*$Log(\frac{Debt}{GDP})$ | | | 0.0814 | |
| | | | (0.0684) | |
| log($\frac{GDP}{capita}$) | 3.71e-05 | 2.91e-05 | -4.25e-05 | -3.32e-05 |
| | (2.86e-05) | (3.68e-05) | (2.86e-05) | (2.88e-05) |
| ER Regime | 0.0255 | -0.00358 | -0.0165 | -0.0108 |
| | (0.0902) | (0.0697) | (0.0696) | (0.0692) |
| ER Volatility | -0.000395*** | -0.00805 | -0.000464*** | -0.000497*** |
| | (8.71e-05) | (0.00727) | (9.75e-05) | (0.000120) |
| $Log(\frac{M2}{GDP})$ | 0.852*** | 0.526** | 0.722*** | 0.595** |
| | (0.194) | (0.227) | (0.173) | (0.245) |
| K Open | 0.0650 | -0.0370 | 0.0486 | 0.0499 |
| | (0.0502) | (0.0422) | (0.0424) | (0.0442) |
| $Log(\frac{Trade}{GDP})$ | 0.922*** | 1.134*** | 0.670*** | 0.659*** |
| | (0.225) | (0.268) | (0.228) | (0.213) |
| Anti-Corruption | -0.0551 | -0.0856 | -0.123* | -0.109 |
| | (0.0705) | (0.0656) | (0.0642) | (0.0661) |
| Crisis Events | -0.275** | -0.155* | -0.277*** | -0.275*** |
| | (0.101) | (0.0879) | (0.0902) | (0.0878) |
| Year Dummy | | | 0.782*** | -0.111 |
| | | | (0.246) | (0.852) |
| Year*$Log(\frac{M2}{GDP})$ | | | | 0.180 |
| | | | | (0.249) |
| Constant | -5.683*** | -3.287*** | -5.326*** | -4.797*** |
| | (1.108) | (1.004) | (0.908) | (0.923) |
| Observations | 675 | 373 | 675 | 675 |
| R-squared | 0.487 | 0.429 | 0.541 | 0.542 |
| Number of countries | 26 | 26 | 26 | 26 |

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

**Table D.3:** *Emerging Economies:FDI*

Emerging Economies:FDI

| | (I) | (II) | (III) | (IV) |
|---|---|---|---|---|
| VARIABLES | $Log(\frac{FDI}{GDP})$ | $Log(\frac{FDI}{GDP})$ | $Log(\frac{FDI}{GDP})$ | $Log(\frac{FDI}{GDP})$ |
| $Log(\frac{Debt}{GDP})$ | -0.357* | -0.162* | -0.487* | -0.326** |
| | (0.178) | (0.0932) | (0.244) | (0.158) |
| Year*$Log(\frac{Debt}{GDP})$ | | | 0.284 | |
| | | | (0.218) | |
| log($\frac{GDP}{capita}$) | 0.000344*** | 0.000172*** | 0.000244** | 0.000232** |
| | (0.000101) | (6.08e-05) | (0.000113) | (0.000106) |
| ER Regime | 0.328*** | 0.0927 | 0.275*** | 0.269*** |
| | (0.0765) | (0.0760) | (0.0692) | (0.0684) |
| ER Volatility | -0.00712 | 0.00563 | -0.00951 | -0.00656 |
| | (0.0111) | (0.00474) | (0.00917) | (0.00817) |
| $Log(\frac{M2}{GDP})$ | 0.729 | 1.221*** | 0.686 | 1.150** |
| | (0.479) | (0.345) | (0.458) | (0.507) |
| K Open | -0.130 | -0.0395 | -0.163* | -0.167* |
| | (0.0887) | (0.0635) | (0.0940) | (0.0851) |
| $Log(\frac{Trade}{GDP})$ | 2.066*** | 1.733*** | 1.667*** | 1.638*** |
| | (0.518) | (0.408) | (0.446) | (0.476) |
| Anti-Corruption | -0.0429 | -0.0148 | -0.117 | -0.124 |
| | (0.110) | (0.0775) | (0.124) | (0.119) |
| Crisis Events | 0.155 | 0.191 | 0.150 | 0.138 |
| | (0.149) | (0.114) | (0.129) | (0.118) |
| Year Dummy | | | 1.409 | 2.801** |
| | | | (0.835) | (1.274) |
| Year*$Log(\frac{M2}{GDP})$ | | | | -0.599* |
| | | | | (0.338) |
| Constant | -8.100*** | -8.487*** | -8.542*** | -9.742*** |
| | (2.137) | (1.682) | (1.943) | (2.105) |
| Observations | 558 | 366 | 558 | 558 |
| R-squared | 0.591 | 0.571 | 0.623 | 0.631 |
| Number of countries | 26 | 26 | 26 | 26 |

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

**Table D.4:** *Emerging Economies:FPI*

Emerging Economies:FPI

| VARIABLES | (I) $Log(\frac{FPI}{GDP})$ | (II) $Log(\frac{FPI}{GDP})$ | (III) $Log(\frac{FPI}{GDP})$ | (IV) $Log(\frac{FPI}{GDP})$ |
|---|---|---|---|---|
| $Log(\frac{Debt}{GDP})$ | -0.175 | -0.159 | 0.129 | -0.185 |
| | (0.183) | (0.154) | (0.222) | (0.161) |
| Year*$Log(\frac{Debt}{GDP})$ | | | -0.468** | |
| | | | (0.192) | |
| log($\frac{GDP}{capita}$) | 0.000112 | 3.88e-05 | -4.97e-06 | -6.22e-06 |
| | (8.07e-05) | (6.50e-05) | (8.26e-05) | (8.70e-05) |
| ER Regime | 0.124 | -0.0195 | 0.0387 | 0.0364 |
| | (0.107) | (0.0681) | (0.0933) | (0.0977) |
| ER Volatility | 0.000642* | 0.00803 | 0.000725** | 0.000730* |
| | (0.000332) | (0.00842) | (0.000342) | (0.000363) |
| $Log(\frac{M2}{GDP})$ | 0.850** | 1.067*** | 0.758** | 1.155*** |
| | (0.353) | (0.373) | (0.334) | (0.284) |
| K Open | 0.0908 | 0.132 | 0.0917 | 0.0679 |
| | (0.0781) | (0.0788) | (0.0791) | (0.0712) |
| $Log(\frac{Trade}{GDP})$ | 1.478*** | 1.214*** | 1.071*** | 1.123*** |
| | (0.319) | (0.289) | (0.309) | (0.302) |
| Anti-Corruption | -0.171* | -0.156 | -0.175* | -0.251** |
| | (0.0985) | (0.0992) | (0.101) | (0.0937) |
| Crisis Events | -0.00745 | 0.0802 | -0.0725 | -0.0464 |
| | (0.153) | (0.128) | (0.115) | (0.119) |
| Year Dummy | | | -0.522 | 2.710* |
| | | | (0.687) | (1.583) |
| Year*$Log(\frac{M2}{GDP})$ | | | | -0.561 |
| | | | | (0.457) |
| Constant | -7.976*** | -8.347*** | -7.202*** | -9.140*** |
| | (1.727) | (1.831) | (1.861) | (1.424) |
| Observations | 468 | 325 | 468 | 468 |
| R-squared | 0.512 | 0.491 | 0.576 | 0.568 |
| Number of countries1 | 26 | 26 | 26 | 26 |

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

**Table D.5:** *Emerging Economies:Trade Agreements and Total Assets*

Emerging Economies:Trade Agreements and Total Assets

| | (I) | (II) | (III) | (IV) |
|---|---|---|---|---|
| VARIABLES | log($\frac{TotalAssets}{GDP}$) | log($\frac{TotalAssets}{GDP}$) | log($\frac{TotalAssets}{GDP}$) | log($\frac{TotalAssets}{GDP}$) |
| $Log(\frac{Debt}{GDP})$ | -0.243*** | -0.0700 | -0.294*** | -0.214*** |
| | (0.0802) | (0.107) | (0.0589) | (0.0739) |
| $Year * Log(\frac{Debt}{GDP})$ | | | 0.153*** | |
| | | | (0.0493) | |
| log($\frac{GDP}{capita}$) | 6.74e-05* | -2.04e-05 | -1.64e-05 | -1.19e-05 |
| | (3.77e-05) | (4.24e-05) | (3.96e-05) | (3.94e-05) |
| ER | 0.161*** | 0.0751 | 0.0917** | 0.0873** |
| | (0.0414) | (0.0506) | (0.0357) | (0.0393) |
| ER Volatility | -0.000720*** | -0.00709** | -0.000743*** | -0.000713*** |
| | (8.45e-05) | (0.00255) | (8.85e-05) | (0.000103) |
| $Log(\frac{M2}{GDP})$ | 0.976*** | 1.136*** | 0.858*** | 0.807*** |
| | (0.180) | (0.206) | (0.181) | (0.255) |
| K Open | 0.0747 | 0.00765 | 0.0626 | 0.0597 |
| | (0.0519) | (0.0382) | (0.0429) | (0.0430) |
| Trade Agreements | 0.117*** | 0.0809*** | 0.0764** | 0.0723** |
| | (0.0281) | (0.0263) | (0.0278) | (0.0267) |
| Anti-Corruption | -0.143*** | -0.127** | -0.193*** | -0.178*** |
| | (0.0431) | (0.0584) | (0.0465) | (0.0516) |
| Crisis Events1 | -0.135 | -0.0996 | -0.164** | -0.167** |
| | (0.0827) | (0.0862) | (0.0648) | (0.0654) |
| Year Dummy19902007 | | | 0.992*** | 0.315 |
| | | | (0.196) | (0.669) |
| $Year * Log(\frac{M2}{GDP})$ | | | | 0.0696 |
| | | | | (0.187) |
| Constant | -6.934*** | -6.351*** | -6.430*** | -6.055*** |
| | (0.746) | (0.987) | (0.773) | (0.958) |
| Observations | 639 | 361 | 639 | 639 |
| R-squared | 0.543 | 0.476 | 0.604 | 0.599 |
| Number of countries | 26 | 26 | 26 | 26 |

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

**Table D.6:** *Emerging Economies:Trade Agreements and FX*

| | FX | | | |
|---|---|---|---|---|
| | (I) | (II) | (III) | (IV) |
| VARIABLES | log($\frac{FX}{GDP}$) | log($\frac{FX}{GDP}$) | log($\frac{FX}{GDP}$) | log($\frac{FX}{GDP}$) |
| $Log(\frac{Debt}{GDP})$ | -0.288*** | -0.0921 | -0.284*** | -0.241*** |
| | (0.0780) | (0.107) | (0.0670) | (0.0699) |
| $Year * Log(\frac{Debt}{GDP})$ | | | 0.0653 | |
| | | | (0.0633) | |
| log($\frac{GDP}{capita}$) | 4.97e-05 | -1.78e-05 | -4.00e-05 | -3.12e-05 |
| | (3.89e-05) | (3.86e-05) | (4.11e-05) | (4.19e-05) |
| ER | 0.0802 | 0.0483 | 0.0203 | 0.0257 |
| | (0.0673) | (0.0553) | (0.0577) | (0.0570) |
| ER Volatility | -0.000649*** | -0.00921 | -0.000630*** | -0.000655*** |
| | (9.62e-05) | (0.00582) | (0.000115) | (0.000107) |
| $Log(\frac{M2}{GDP})$ | 0.993*** | 0.953*** | 0.814*** | 0.706*** |
| | (0.181) | (0.234) | (0.158) | (0.231) |
| K Open | 0.0516 | -0.0348 | 0.0341 | 0.0347 |
| | (0.0622) | (0.0479) | (0.0548) | (0.0547) |
| Trade Agreements | 0.125*** | 0.0797** | 0.0737*** | 0.0696** |
| | (0.0276) | (0.0295) | (0.0263) | (0.0273) |
| Anti-Corruption | -0.110* | -0.151** | -0.171*** | -0.159** |
| | (0.0638) | (0.0664) | (0.0593) | (0.0641) |
| Crisis Events | -0.225** | -0.127 | -0.248** | -0.247*** |
| | (0.0984) | (0.0980) | (0.0904) | (0.0883) |
| Year Dummy | | | 0.813*** | 0.0523 |
| | | | (0.197) | (0.786) |
| $Year * Log(\frac{M2}{GDP})$ | | | | 0.157 |
| | | | | (0.222) |
| Constant | -7.248*** | -5.920*** | -6.370*** | -5.915*** |
| | (0.742) | (1.085) | (0.614) | (0.785) |
| Observations | 675 | 373 | 675 | 675 |
| R-squared | 0.445 | 0.363 | 0.516 | 0.517 |
| Number of countries | 26 | 26 | 26 | 26 |

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

**Table D.7:** *Emerging Economies:Trade Agreements and FDI*

Emerging Economies:Trade Agreements and FDI

| VARIABLES | (I) $\log(\frac{FDI}{GDP})$ | (II) $\log(\frac{FDI}{GDP})$ | (III) $\log(\frac{FDI}{GDP})$ | (IV) $\log(\frac{FDI}{GDP})$ |
|---|---|---|---|---|
| $Log(\frac{Debt}{GDP})$ | -0.330* | -0.178 | -0.462** | -0.289* |
| | (0.176) | (0.110) | (0.216) | (0.156) |
| $Year * Log(\frac{Debt}{GDP})$ | | | 0.308 | |
| | | | (0.193) | |
| $\log(\frac{GDP}{capita})$ | 0.000305*** | 0.000104 | 0.000179 | 0.000162 |
| | (0.000107) | (8.35e-05) | (0.000123) | (0.000116) |
| ER | 0.398*** | 0.177* | 0.307*** | 0.294*** |
| | (0.0732) | (0.0917) | (0.0715) | (0.0655) |
| ER Volatility | -0.0105 | 0.00419 | -0.0131 | -0.00968 |
| | (0.0110) | (0.00614) | (0.00908) | (0.00844) |
| $Log(\frac{M2}{GDP})$ | 1.312** | 1.884*** | 1.088** | 1.623*** |
| | (0.484) | (0.373) | (0.476) | (0.489) |
| K Open | -0.133 | -0.0349 | -0.178* | -0.180* |
| | (0.0874) | (0.0596) | (0.0970) | (0.0876) |
| Trade Agreements | 0.203*** | 0.108** | 0.148** | 0.157*** |
| | (0.0637) | (0.0495) | (0.0554) | (0.0529) |
| Anti-Corruption | -0.179* | -0.125 | -0.241** | -0.245** |
| | (0.101) | (0.0917) | (0.111) | (0.103) |
| Crisis Events | 0.170 | 0.230* | 0.158 | 0.147 |
| | (0.179) | (0.119) | (0.148) | (0.139) |
| Year Dummy | | | 1.717** | 3.455*** |
| | | | (0.813) | (1.116) |
| $Year * Log(\frac{M2}{GDP})$ | | | | -0.715** |
| | | | | (0.282) |
| Constant | -12.28*** | -12.53*** | -11.61*** | -12.99*** |
| | (1.602) | (1.679) | (1.711) | (1.713) |
| Observations | 558 | 366 | 558 | 558 |
| R-squared | 0.515 | 0.495 | 0.579 | 0.591 |
| Number of countries | 26 | 26 | 26 | 26 |

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

**Table D.8:** *Emerging Economies:Trade Agreements and FPI*

Emerging Economies:Trade Agreements and FPI

| VARIABLES | (I) $\log(\frac{FPI}{GDP})$ | (II) $\log(\frac{FPI}{GDP})$ | (III) $\log(\frac{FPI}{GDP})$ | (IV) $\log(\frac{FPI}{GDP})$ |
|---|---|---|---|---|
| $Log(\frac{Debt}{GDP})$ | -0.228 | -0.175 | 0.0717 | -0.215 |
| | (0.184) | (0.174) | (0.199) | (0.161) |
| $Year * Log(\frac{Debt}{GDP})$ | | | -0.429** | |
| | | | (0.187) | |
| $\log(\frac{GDP}{capita})$ | 0.000124* | -2.09e-07 | -2.73e-05 | -3.17e-05 |
| | (6.56e-05) | (8.30e-05) | (7.71e-05) | (7.95e-05) |
| ER | 0.246** | 0.0577 | 0.0975 | 0.0956 |
| | (0.110) | (0.0844) | (0.0955) | (0.0993) |
| ER Volatility | 0.000169 | 0.00727 | 0.000375 | 0.000339 |
| | (0.000270) | (0.00939) | (0.000269) | (0.000283) |
| $Log(\frac{M2}{GDP})$ | 1.232*** | 1.588*** | 0.988*** | 1.317*** |
| | (0.337) | (0.294) | (0.311) | (0.324) |
| K Open | 0.0827 | 0.121 | 0.0867 | 0.0690 |
| | (0.0862) | (0.0881) | (0.0868) | (0.0784) |
| Trade Agreements | 0.136*** | 0.0563 | 0.0816*** | 0.0916*** |
| | (0.0330) | (0.0433) | (0.0254) | (0.0271) |
| Anti-Corruption | -0.268** | -0.240** | -0.256** | -0.324*** |
| | (0.103) | (0.0958) | (0.101) | (0.0895) |
| Crisis Events | 0.0723 | 0.117 | -0.0337 | -0.00683 |
| | (0.165) | (0.147) | (0.121) | (0.125) |
| Year Dummy | | | -0.195 | 2.595 |
| | | | (0.624) | (1.636) |
| $Year * Log(\frac{M2}{GDP})$ | | | | -0.463 |
| | | | | (0.468) |
| Constant | -11.34*** | -11.40*** | -9.456*** | -11.18*** |
| | (1.244) | (1.476) | (1.343) | (1.254) |
| Observations | 468 | 325 | 468 | 468 |
| R-squared | 0.455 | 0.449 | 0.548 | 0.539 |
| Number of countries | 26 | 26 | 26 | 26 |

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

**Table D.9:** *Summary results for first-stage regressions*

First-Stage Regression

| Variable | Shea Partial R2 | Partial R2 | F( 1, 25) | P-value |
|---|---|---|---|---|
| | (I) | (II) | (III) | (IV) |
| $\log(\frac{Trade}{GDP})$ | 0.0957 | 0.0957 | 61.57 | 0.0000 |

**Table D.10:** *Underidentification tests*

Underidentification tests

| Tests | Chi-sq(1) | P-val |
|---|---|---|
| Kleibergen-Paap rk LM statistic | Chi-sq(1)=3.84 | P-val=0.0502 |
| Kleibergen-Paap rk Wald statistic | Chi-sq(1)=67.64 | P-val=0.0000 |

Note: Ho: matrix of reduced form coefficients has rank=K1-1 (underidentified)
Ha: matrix has rank=K1 (identified)

**Table D.11:** *Underidentification tests*

Weak identification test

| Test | F statistics |
|---|---|
| Kleibergen-Paap Wald rk F statistic | 61.57 |

Ho: equation is weakly identified

**Table D.12:** *Weak-instrument-robust inference*

Weak identification test

| Tests | Statistics | P-val |
|---|---|---|
| Anderson-Rubin Wald test | F(1,25)= 49.13 | P-val=0.0000 |
| Anderson-Rubin Wald test | Chi-sq(1)=53.97 | P-val=0.0000 |

Tests of joint significance of endogenous regressors B1 in main equation
Ho: B1=0 and overidentifying restrictions are valid

**Table D.13:** *Emerging Economies:Instrument Variable and Total Assets*

Emerging Economies:Instrument Variable and Total Assets

| VARIABLES | (I) $\log(\frac{TotalAssets}{GDP})$ | (II) $\log(\frac{TotalAssets}{GDP})$ | (III) $\log(\frac{TotalAssets}{GDP})$ | (IV) $\log(\frac{TotalAssets}{GDP})$ |
|---|---|---|---|---|
| $\log(\frac{Trade}{GDP})$ | 1.531*** | 1.883*** | 1.189*** | 1.112*** |
| | (0.362) | (0.563) | (0.425) | (0.418) |
| $Log(\frac{Debt}{GDP})$ | -0.291** | -0.0337 | -0.345*** | -0.254*** |
| | (0.117) | (0.104) | (0.0988) | (0.0904) |
| $Year * Log(\frac{Debt}{GDP})$ | | | 0.162** | |
| | | | (0.0688) | |
| $\log(\frac{GDP}{capita})$ | 3.70e-05 | 3.83e-05 | -1.28e-05 | -6.47e-06 |
| | (5.05e-05) | (3.09e-05) | (4.30e-05) | (3.81e-05) |
| ER | 0.0386 | -0.0282 | 0.0221 | 0.0230 |
| | (0.0699) | (0.0707) | (0.0595) | (0.0664) |
| ER Volatility | -0.000310*** | -0.00594 | -0.000436*** | -0.000433*** |
| | (0.000107) | (0.00421) | (0.000111) | (0.000139) |
| $Log(\frac{M2}{GDP})$ | 0.612** | 0.368 | 0.616** | 0.557* |
| | (0.264) | (0.281) | (0.244) | (0.320) |
| K Open | 0.0972* | 0.0134 | 0.0853* | 0.0810* |
| | (0.0561) | (0.0291) | (0.0442) | (0.0434) |
| Anti-Corruption | -0.0247 | 0.000820 | -0.0891 | -0.0782 |
| | (0.0824) | (0.0524) | (0.0774) | (0.0769) |
| Crisis Events | -0.186** | -0.129* | -0.193*** | -0.193*** |
| | (0.0749) | (0.0721) | (0.0630) | (0.0626) |
| Year Dummy | | | 0.830*** | 0.00571 |
| | | | (0.256) | (0.834) |
| $Year * Log(\frac{M2}{GDP})$ | | | | 0.107 |
| | | | | (0.243) |
| Constant | -3.368*** | -1.238 | -3.611*** | -3.281** |
| | (1.278) | (1.130) | (1.211) | (1.345) |
| Observations | 639 | 361 | 639 | 639 |
| R-squared | 0.746 | 0.819 | 0.779 | 0.780 |

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

**Table D.14:** *Emerging Economies:Instrument Variable and FX*

Emerging Economies:Instrument Variable and FX

| VARIABLES | (I) $\log(\frac{FX}{GDP})$ | (II) $\log(\frac{FX}{GDP})$ | (III) $\log(\frac{FX}{GDP})$ | (IV) $\log(\frac{FX}{GDP})$ |
|---|---|---|---|---|
| $\log(\frac{Trade}{GDP})$ | 1.635*** | 1.865*** | 1.180*** | 1.099** |
| | (0.370) | (0.645) | (0.447) | (0.464) |
| $Log(\frac{Debt}{GDP})$ | -0.338*** | -0.0657 | -0.350*** | -0.283*** |
| | (0.113) | (0.107) | (0.102) | (0.0839) |
| $Year * Log(\frac{Debt}{GDP})$ | | | 0.102 | |
| | | | (0.0817) | |
| $\log(\frac{GDP}{capita})$ | -1.11e-05 | 3.89e-05 | -5.69e-05 | -4.57e-05 |
| | (5.70e-05) | (4.58e-05) | (4.23e-05) | (3.91e-05) |
| ER | -0.0585 | -0.0540 | -0.0615 | -0.0498 |
| | (0.0855) | (0.0853) | (0.0733) | (0.0791) |
| ER Volatility | -0.000283** | -0.00803 | -0.000388*** | -0.000426*** |
| | (0.000119) | (0.00762) | (0.000110) | (0.000140) |
| $Log(\frac{M2}{GDP})$ | 0.609*** | 0.180 | 0.596*** | 0.486* |
| | (0.232) | (0.337) | (0.210) | (0.288) |
| K Open | 0.0980 | -0.0274 | 0.0734 | 0.0712 |
| | (0.0654) | (0.0384) | (0.0528) | (0.0526) |
| Anti-Corruption | 0.00417 | -0.0263 | -0.0730 | -0.0652 |
| | (0.0995) | (0.0747) | (0.0894) | (0.0893) |
| Crisis Events | -0.279*** | -0.156* | -0.279*** | -0.276*** |
| | (0.0936) | (0.0863) | (0.0858) | (0.0839) |
| Year Dummy | | | 0.727*** | -0.200 |
| | | | (0.264) | (0.908) |
| $Year * Log(\frac{M2}{GDP})$ | | | | 0.178 |
| | | | | (0.266) |
| Constant | -3.361*** | -1.070 | -3.575*** | -3.148*** |
| | (1.093) | (1.326) | (1.016) | (1.145) |
| Observations | 675 | 373 | 675 | 675 |
| R-squared | 0.658 | 0.743 | 0.706 | 0.711 |

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

**Table D.15:** *Emerging Economies:Instrument Variable and FDI*

Emerging Economies:Instrument Variable and FDI

| VARIABLES | (I) $\log(\frac{FDI}{GDP})$ | (II) $\log(\frac{FDI}{GDP})$ | (III) $\log(\frac{FDI}{GDP})$ | (IV) $\log(\frac{FDI}{GDP})$ |
|---|---|---|---|---|
| $\log(\frac{Trade}{GDP})$ | 3.075*** | 2.542** | 2.746*** | 2.875*** |
| | (0.770) | (1.011) | (0.881) | (0.828) |
| $Log(\frac{Debt}{GDP})$ | -0.347* | -0.144 | -0.499* | -0.339** |
| | (0.184) | (0.0953) | (0.276) | (0.172) |
| $Year * Log(\frac{Debt}{GDP})$ | | | 0.283 | |
| | | | (0.237) | |
| $\log(\frac{GDP}{capita})$ | 0.000322*** | 0.000183*** | 0.000260** | 0.000252** |
| | (0.000112) | (5.31e-05) | (0.000108) | (0.000101) |
| ER | 0.256*** | 0.0367 | 0.227*** | 0.215** |
| | (0.0917) | (0.108) | (0.0840) | (0.0859) |
| ER Volatility | -0.00779 | 0.00560 | -0.00896 | -0.00613 |
| | (0.0121) | (0.00458) | (0.0103) | (0.00904) |
| $Log(\frac{M2}{GDP})$ | 0.299 | 0.844* | 0.321 | 0.703 |
| | (0.605) | (0.479) | (0.576) | (0.635) |
| K Open | -0.111 | -0.0307 | -0.133 | -0.132 |
| | (0.0997) | (0.0613) | (0.101) | (0.0956) |
| Anti-Corruption | 0.0480 | 0.0536 | -0.0114 | -0.00105 |
| | (0.110) | (0.0953) | (0.125) | (0.119) |
| Crisis Events | 0.179 | 0.190 | 0.177 | 0.169 |
| | (0.139) | (0.119) | (0.128) | (0.117) |
| Year Dummy | | | 1.168 | 2.399* |
| | | | (0.876) | (1.371) |
| $Year * Log(\frac{M2}{GDP})$ | | | | -0.563 |
| | | | | (0.380) |
| Constant | -5.101* | -4.759** | -5.616** | -6.494** |
| | (2.811) | (2.385) | (2.789) | (2.858) |
| Observations | 558 | 366 | 558 | 558 |
| R-squared | 0.769 | 0.865 | 0.787 | 0.786 |

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

**Table D.16:** *Emerging Economies:Instrument Variable and FPI*

Emerging Economies:Instrument Variable and FPI

| VARIABLES | (I) $\log(\frac{FPI}{GDP})$ | (II) $\log(\frac{FPI}{GDP})$ | (III) $\log(\frac{FPI}{GDP})$ | (IV) $\log(\frac{FPI}{GDP})$ |
|---|---|---|---|---|
| $\log(\frac{Trade}{GDP})$ | 2.037*** | 1.359 | 1.478*** | 1.723*** |
| | (0.463) | (1.115) | (0.512) | (0.566) |
| $Log(\frac{Debt}{GDP})$ | -0.152 | -0.156 | 0.150 | -0.168 |
| | (0.176) | (0.139) | (0.216) | (0.152) |
| $Year * Log(\frac{Debt}{GDP})$ | | | -0.482** | |
| | | | (0.191) | |
| $\log(\frac{GDP}{capita})$ | 8.26e-05 | 4.07e-05 | -6.10e-06 | -7.56e-06 |
| | (9.62e-05) | (6.25e-05) | (8.71e-05) | (9.51e-05) |
| ER | 0.0524 | -0.0311 | 0.00632 | -0.0107 |
| | (0.113) | (0.0997) | (0.103) | (0.106) |
| ER Volatility | 0.000761** | 0.00805 | 0.000823*** | 0.000895** |
| | (0.000307) | (0.00811) | (0.000310) | (0.000358) |
| $Log(\frac{M2}{GDP})$ | 0.632 | 0.995 | 0.636 | 1.037*** |
| | (0.460) | (0.619) | (0.414) | (0.291) |
| K Open | 0.108 | 0.135* | 0.101 | 0.0779 |
| | (0.0766) | (0.0731) | (0.0749) | (0.0667) |
| Anti-Corruption | -0.121 | -0.144 | -0.136 | -0.201* |
| | (0.112) | (0.122) | (0.107) | (0.108) |
| Crisis Events | -0.0236 | 0.0782 | -0.0765 | -0.0503 |
| | (0.141) | (0.127) | (0.110) | (0.114) |
| Year Dummy | | | -0.672 | 2.830* |
| | | | (0.693) | (1.528) |
| $Year * Log(\frac{M2}{GDP})$ | | | | -0.644 |
| | | | | (0.462) |
| Constant | -5.518*** | -6.148** | -5.103** | -6.897*** |
| | (2.091) | (2.713) | (2.125) | (1.572) |
| Observations | 468 | 325 | 468 | 468 |
| R-squared | 0.818 | 0.884 | 0.844 | 0.839 |

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

APPENDIX E

# APPENDIX CHAPTER 3 C: ADVANCED ECONOMIES

This section provides a comparison of the results based on both non-instrument variable regressions and instrument variable regressions for emerging economies and industrialized economies which again highlight some key differences between the two set of economies. For easy comparison, the results for total assets and each class of assets are provided in Table F.5-F.8 and the discussion of results is provided in Section E.1 below.

## E.1 Emerging Economies Vs. Industrial Economies

The paper discusses, how different macroeconomic, institutional, financial and trade variables can help explain the evolution of total foreign assets and different classes of assets in emerging economies. However, a comparison between emerging economies and industrialized economies can provide more insights for the accumulation of assets based on wide set of variables.[1] Before that, it must be noted that the variable based on short term external debt will not be appropriate for these economies since there is no foreign currency denominated debt held by these economies. I again use two specifications based on a Non-IV approach and an IV approach, for this section. The first specification with a Non-IV approach simply uses trade openness indicator to compare the bench mark results from emerging economies. These results for advanced economies are reported in Table E.2 - E.5. While the second specification based on IV approach is reported in Table E.6- E.9, is based on using trade agreements as IV for trade openness for advanced economies. The comparison between the estimated coefficients from these two approaches is also provided in Table F.5 - F.8, column 1 and 3.

[1] List of advanced economies used is provided in the appendix in Table E.1.

The first set of results (Table E.2 - E.5) highlight some of the key differences between these emerging and advanced group of countries and their behavior in terms of accumulation of foreign assets. A few key contrasts appear immediately. The first one is that in industrial economies, GDP per capita, though small, is positively associated with all forms of foreign assets except foreign exchange reserves. In emerging economies GDP per capita is only relevant for FDI where the estimated coefficients are bigger than advanced economies respective coefficients. The second key contrast comes with respect to capital openness indicator. In emerging economies, capital openness indicator was unable to explain any evolution of foreign assets and atleast in terms of FDI in emerging economies the association is though insignificant, it is negative, while in advanced economies, capital openness is positively and significantly related to foreign asset accumulation of any class. This is the key distinguishing factor since the associated coefficient is economically significant as well. Another difference appears for the anti-corruption variable which is insignificant for the total foreign assets and FDI however for FPI and FX the effect is negatively and economically more significant than the corresponding coefficients from emerging economies. Lastly, comparison between FX reserves in industrial and emerging economies (see Table F.6, also show that financial depth is not relevant for FX in industrial economies which is very different to what is found for emerging economies. Furthermore, crisis events seem to be unrelated in this present case which relevant for FX and total assets in emerging economies. The R squared for industrialized economies is bigger as compared to the R squared from similar set of specifications for emerging economies except for foreign exchange reserves.

Next I compare the results for the industrialized economies with an IV specification (Table E.6 - E.9) to a non-IV (Table E.2 - E.5)specification and then I turn to a comparison of the former with the IV specification for emerging economies. The first comparison (see Table F.5 - F.8, column 1 and 3), highlights that except for FDI, finan-

cial depth seems to play no significant role in the evolution of foreign assets. Secondly, the instrument variable has now been insignificant for both FX and FDI but highly significant for FPI.

The second comparison exercise shows more interesting results. First of all, the instrument variable for trade openness has been significantly positive for emerging economies while in industrial economies, the variable becomes insignificant for FX and FDI except for the specification that is based on the restricted sample for 1990 to 2007. But the results do not sustain with other structural break specifications. The second key interesting comparison reveals that capital openness is much more relevant for industrial economies for all classes of assets and the coefficients are economically very significant as well. Financial depth that has been a major factor for the emerging economies, seem to have no significance for FX in industrialized economies but instead significant for FDI. Again, with regards to exchange rate volatility and crisis events, advanced economies' all classes of foreign assets are mostly not responsive. Overall, the main differences are not very evident with the total assets but the differences appear when different classes of assets are considered and analyzed individually. The R squared for advanced economies specifications are higher than emerging economies which may be primarily due to difference in the levels of foreign assets accumulated in industrialized economies.

Overall, when comparison is made between advanced economies and emerging economies, total assets seem to behave quite similarly but the analysis based on sub-assets show that these results are masked since FX and FPI show either different affects or significance from the same variables in the two groups of countries. This is indeed representative of many differences that are inherent in these groups. While the time invariant differences are dealt with using fixed effects model, the time varying differences

do show some stark differences between different classes of assets in the two groups of countries.

**Table E.1:** *Advanced Economies*

Advanced Economies

| Country | Time Period | Country | Time Period |
|---|---|---|---|
| Australia | 1973-2007 | Austria | 1973-2007 |
| Belgium | 1973-2007 | Canada | 1970-2007 |
| Denmark | 1970-2007 | Finland | 1973-2007 |
| France | 1973-2007 | Germany | 1973-2007 |
| Greece | 1973-2007 | Ireland | 1973-2007 |
| Italy | 1970-2007 | Japan | 1970-2007 |
| Netherlands | 1972-2007 | Norway | 1973-2007 |
| Spain | 1971-2007 | Sweden | 1970-2007 |
| Switzerland | 1970-2007 | United Kingdom | 1970-2007 |
| United States | 1970-2007 | | |

**Table E.2:** *Advanced Economies:Total Assets*

Advanced Economies:Total Assets

| VARIABLES | (I) $Log\frac{TotalAssets}{GDP}$ | (II) $Log\frac{TotalAssets}{GDP}$ | (III) $Log\frac{TotalAssets}{GDP}$ | (IV) $Log\frac{TotalAssets}{GDP}$ |
|---|---|---|---|---|
| log($\frac{GDP}{capita}$) | 3.37e-05*** | 2.13e-05*** | 2.74e-05*** | 2.70e-05*** |
| | (5.56e-06) | (4.31e-06) | (4.24e-06) | (5.11e-06) |
| ER | 0.0624 | -0.0860 | 0.0589 | 0.0600 |
| | (0.0433) | (0.166) | (0.0457) | (0.0456) |
| ER Volatility | -0.109 | -0.0555 | -0.186 | -0.207 |
| | (0.195) | (0.160) | (0.172) | (0.142) |
| $Log(\frac{M2}{GDP})$ | 0.621*** | 0.375* | 0.524*** | 0.497*** |
| | (0.162) | (0.186) | (0.169) | (0.158) |
| $Year * Log(\frac{M2}{GDP})$ | | | | 0.0488 |
| | | | | (0.175) |
| K Open | 0.229*** | 0.178 | 0.204*** | 0.211*** |
| | (0.0429) | (0.170) | (0.0453) | (0.0607) |
| $Log\frac{Trade}{GDP}$ | 1.486*** | 1.953*** | 1.323*** | 1.348*** |
| | (0.311) | (0.251) | (0.272) | (0.229) |
| Anti-Corruption | -0.113 | -0.121** | -0.110 | -0.104 |
| | (0.0710) | (0.0511) | (0.0655) | (0.0640) |
| Crisis Events | 0.0324 | -0.0897 | -0.0174 | -0.0202 |
| | (0.106) | (0.146) | (0.0808) | (0.0820) |
| Year Dummy | | | 0.254** | 0.0492 |
| | | | (0.0934) | (0.777) |
| Constant | -3.493*** | -1.099 | -3.193*** | -3.104*** |
| | (0.694) | (1.031) | (0.712) | (0.648) |
| Observations | 311 | 185 | 311 | 311 |
| R-squared | 0.865 | 0.738 | 0.872 | 0.872 |
| Number of countries | 19 | 19 | 19 | 19 |

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

**Table E.3:** *Advanced Economies:FX*

Advanced Economies:FX

| VARIABLES | (I) $\log(\frac{FX}{GDP})$ | (II) $\log(\frac{FX}{GDP})$ | (III) $\log(\frac{FX}{GDP})$ | (IV) $\log(\frac{FX}{GDP})$ |
|---|---|---|---|---|
| $\log(\frac{GDP}{capita})$ | -1.47e-07 | -2.40e-05* | -8.12e-06 | -1.03e-05 |
| | (6.85e-06) | (1.30e-05) | (8.80e-06) | (9.03e-06) |
| ER | -0.0294 | -0.0206 | -0.0338 | -0.0271 |
| | (0.0673) | (0.164) | (0.0728) | (0.0715) |
| ER Volatility | -0.0923 | -0.568 | -0.190 | -0.312 |
| | (0.317) | (0.392) | (0.300) | (0.289) |
| $Log(\frac{M2}{GDP})$ | 0.184 | -0.380 | 0.0606 | -0.103 |
| | (0.225) | (0.402) | (0.252) | (0.280) |
| $Year * Log(\frac{M2}{GDP})$ | | | | 0.294 |
| | | | | (0.182) |
| K Open | 0.208** | -0.00489 | 0.177** | 0.220** |
| | (0.0832) | (0.172) | (0.0734) | (0.0797) |
| $Log\frac{Trade}{GDP}$ | 0.606* | 1.324** | 0.400 | 0.547* |
| | (0.342) | (0.553) | (0.275) | (0.268) |
| Anti-Corruption | -0.310** | -0.335*** | -0.305** | -0.268** |
| | (0.131) | (0.0825) | (0.122) | (0.118) |
| Crisis Events | 0.169 | -0.128 | 0.106 | 0.0893 |
| | (0.193) | (0.143) | (0.162) | (0.166) |
| Year Dummy | | | 0.322* | -0.914 |
| | | | (0.183) | (0.788) |
| Constant | -2.306* | 1.948 | -1.926 | -1.388 |
| | (1.316) | (2.174) | (1.388) | (1.500) |
| Observations | 311 | 185 | 311 | 311 |
| R-squared | 0.313 | 0.309 | 0.335 | 0.343 |
| Number of countries | 19 | 19 | 19 | 19 |

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

**Table E.4:** *Advanced Economies:FDI*

Advanced Economies:FDI

| VARIABLES | (I) $\log(\frac{FDI}{GDP})$ | (II) $\log(\frac{FDI}{GDP})$ | (III) $\log(\frac{FDI}{GDP})$ | (IV) $\log(\frac{FDI}{GDP})$ |
|---|---|---|---|---|
| $\log(\frac{GDP}{capita})$ | 3.74e-05*** | 1.72e-05*** | 3.13e-05*** | 3.39e-05*** |
| | (9.55e-06) | (4.77e-06) | (7.48e-06) | (8.90e-06) |
| ER | 0.142*** | -0.132 | 0.138*** | 0.130*** |
| | (0.0382) | (0.198) | (0.0352) | (0.0292) |
| ER Volatility | -0.149 | -0.371*** | -0.224 | -0.0751 |
| | (0.172) | (0.126) | (0.148) | (0.180) |
| $Log(\frac{M2}{GDP})$ | 0.400 | 0.520*** | 0.305 | 0.504** |
| | (0.236) | (0.172) | (0.279) | (0.208) |
| $Year * Log(\frac{M2}{GDP})$ | | | | -0.359 |
| | | | | (0.320) |
| K Open | 0.347*** | 0.262 | 0.323*** | 0.270** |
| | (0.0768) | (0.213) | (0.0835) | (0.0982) |
| $Log\frac{Trade}{GDP}$ | 0.960** | 1.552*** | 0.802** | 0.622 |
| | (0.335) | (0.321) | (0.334) | (0.415) |
| Anti-Corruption | 0.0222 | -0.00623 | 0.0256 | -0.0195 |
| | (0.0655) | (0.0569) | (0.0674) | (0.0910) |
| Crisis Events | 0.241 | -0.118 | 0.192 | 0.213 |
| | (0.198) | (0.164) | (0.157) | (0.159) |
| Year Dummy | | | 0.248* | 1.757 |
| | | | (0.141) | (1.417) |
| Constant | -4.995*** | -3.289*** | -4.703*** | -5.359*** |
| | (1.065) | (0.878) | (1.213) | (1.083) |
| Observations | 311 | 185 | 311 | 311 |
| R-squared | 0.810 | 0.586 | 0.815 | 0.820 |
| Number of countries | 19 | 19 | 19 | 19 |

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

**Table E.5:** *Advanced Economies:FPI*

Advanced Economies:FPI

| VARIABLES | (I) $\log(\frac{FPI}{GDP})$ | (II) $\log(\frac{FPI}{GDP})$ | (III) $\log(\frac{FPI}{GDP})$ | (IV) $\log(\frac{FPI}{GDP})$ |
|---|---|---|---|---|
| $\log(\frac{GDP}{capita})$ | 7.77e-05*** | 4.47e-05*** | 5.57e-05*** | 5.61e-05*** |
| | (1.46e-05) | (6.90e-06) | (9.22e-06) | (9.74e-06) |
| ER | 0.159 | -0.00652 | 0.137 | 0.134 |
| | (0.120) | (0.181) | (0.128) | (0.132) |
| ER Volatility | 0.332 | 0.644* | 0.0659 | 0.111 |
| | (0.467) | (0.342) | (0.329) | (0.324) |
| $Log(\frac{M2}{GDP})$ | 1.092* | 0.265 | 0.838 | 0.929 |
| | (0.626) | (0.323) | (0.525) | (0.541) |
| $Year * Log(\frac{M2}{GDP})$ | | | | -0.111 |
| | | | | (0.337) |
| K Open | 0.496*** | 0.348 | 0.411*** | 0.396*** |
| | (0.0654) | (0.251) | (0.0483) | (0.0898) |
| $Log\frac{Trade}{GDP}$ | 2.323** | 2.535*** | 1.740** | 1.672** |
| | (0.870) | (0.404) | (0.669) | (0.773) |
| Anti-Corruption | -0.268* | -0.266** | -0.258** | -0.273** |
| | (0.142) | (0.103) | (0.105) | (0.124) |
| Crisis Events | 0.170 | -0.0575 | -0.0159 | -0.0161 |
| | (0.273) | (0.221) | (0.191) | (0.195) |
| Year Dummy | | | 0.870*** | 1.338 |
| | | | (0.180) | (1.550) |
| Constant | -7.539** | -1.887 | -6.825*** | -7.160*** |
| | (2.779) | (1.764) | (2.093) | (2.099) |
| Observations | 299 | 185 | 299 | 299 |
| R-squared | 0.872 | 0.691 | 0.893 | 0.893 |
| Number of countries | 19 | 19 | 19 | 19 |

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

**Table E.6:** *Advanced Economies:Instrument Variable and Total Assets*

Advanced Economies:Instrument Variable and Total Assets

| VARIABLES | (I) $Log\frac{TA}{GDP}$ | (II) $Log\frac{TA}{GDP}$ | (III) $Log\frac{TA}{GDP}$ | (IV) $Log\frac{TA}{GDP}$ |
|---|---|---|---|---|
| log($\frac{Trade}{GDP}$) | 1.811*** | 3.150*** | 1.721*** | 1.780*** |
| | (0.265) | (0.660) | (0.431) | (0.501) |
| log($\frac{GDP}{capita}$) | 3.32e-05*** | 1.91e-05*** | 2.81e-05*** | 2.71e-05*** |
| | (2.90e-06) | (4.91e-06) | (4.23e-06) | (5.16e-06) |
| ER Regime | 0.0560* | -0.0845 | 0.0524 | 0.0558 |
| | (0.0317) | (0.146) | (0.0396) | (0.0372) |
| ER Regime Volatility | -0.212 | -0.426* | -0.286*** | -0.341*** |
| | (0.177) | (0.223) | (0.100) | (0.121) |
| $Log(\frac{M2}{GDP})$ | 0.610*** | 0.329 | 0.530*** | 0.453*** |
| | (0.110) | (0.231) | (0.166) | (0.129) |
| $Year * Log(\frac{M2}{GDP})$ | | | | 0.140 |
| | | | | (0.266) |
| K Open | 0.236*** | 0.227 | 0.217*** | 0.238*** |
| | (0.0369) | (0.160) | (0.0508) | (0.0770) |
| Anti-Corruption | -0.0895** | -0.0271 | -0.0838* | -0.0670 |
| | (0.0349) | (0.0624) | (0.0488) | (0.0555) |
| Crisis Events | 0.0922 | 0.0348 | 0.0596 | 0.0495 |
| | (0.0903) | (0.147) | (0.0900) | (0.0796) |
| Year Dummy | | | 0.203 | -0.381 |
| | | | (0.128) | (1.212) |
| Constant | -2.111*** | 1.988 | -1.890** | -1.580 |
| | (0.631) | (1.859) | (0.767) | (0.969) |
| Observations | 311 | 185 | 311 | 311 |
| R-squared | 0.937 | 0.929 | 0.940 | 0.940 |

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

**Table E.7:** *Advanced Economies:Instrument Variable and FX*

Advanced Economies:Instrument Variable and FX

| VARIABLES | (I) log($\frac{FX}{GDP}$) | (II) log($\frac{FX}{GDP}$) | (III) log($\frac{FX}{GDP}$) | (IV) log($\frac{FX}{GDP}$) |
|---|---|---|---|---|
| log($\frac{Trade}{GDP}$) | 1.434 | 3.297** | 1.345 | 1.558 |
| | (1.008) | (1.577) | (1.054) | (1.158) |
| log($\frac{GDP}{capita}$) | -1.28e-06 | -2.76e-05** | -6.31e-06 | -1.01e-05 |
| | (8.29e-06) | (1.38e-05) | (9.71e-06) | (9.22e-06) |
| ER Regime | -0.0457 | -0.0181 | -0.0492 | -0.0370 |
| | (0.0510) | (0.142) | (0.0542) | (0.0501) |
| ER Regime Volatility | -0.353 | -1.178* | -0.427 | -0.627 |
| | (0.407) | (0.603) | (0.367) | (0.407) |
| $Log(\frac{M2}{GDP})$ | 0.155 | -0.455 | 0.0762 | -0.205 |
| | (0.212) | (0.471) | (0.222) | (0.300) |
| $Year * Log(\frac{M2}{GDP})$ | | | | 0.507 |
| | | | | (0.322) |
| K Open | 0.227*** | 0.0760 | 0.208*** | 0.282*** |
| | (0.0828) | (0.126) | (0.0775) | (0.0929) |
| Anti-Corruption | -0.249** | -0.179** | -0.244*** | -0.182* |
| | (0.103) | (0.0883) | (0.0944) | (0.0958) |
| Crisis Events | 0.321 | 0.0768 | 0.289 | 0.253 |
| | (0.219) | (0.153) | (0.211) | (0.192) |
| Year Dummy | | | 0.201 | -1.921 |
| | | | (0.205) | (1.464) |
| Constant | -2.252 | 4.241 | -2.034 | -0.908 |
| | (2.365) | (3.833) | (2.328) | (2.831) |
| Observations | 311 | 185 | 311 | 311 |
| R-squared | 0.800 | 0.826 | 0.804 | 0.806 |

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

**Table E.8:** *Advanced Economies:Instrument Variable and FDI*

Advanced Economies:Instrument Variable and FDI

| VARIABLES | (I) log($\frac{FDI}{GDP}$) | (II) log($\frac{FDI}{GDP}$) | (III) log($\frac{FDI}{GDP}$) | (IV) log($\frac{FDI}{GDP}$) |
|---|---|---|---|---|
| log($\frac{Trade}{GDP}$) | 0.539 | 2.035*** | 0.406 | 0.219 |
| | (0.552) | (0.626) | (0.583) | (0.603) |
| log($\frac{GDP}{capita}$) | 3.80e-05*** | 1.63e-05*** | 3.05e-05*** | 3.38e-05*** |
| | (9.11e-06) | (4.63e-06) | (6.48e-06) | (8.06e-06) |
| ER Regime | 0.150*** | -0.132 | 0.145*** | 0.134*** |
| | (0.0333) | (0.183) | (0.0299) | (0.0222) |
| ER Regime Volatility | -0.0163 | -0.520** | -0.125 | 0.0505 |
| | (0.133) | (0.218) | (0.115) | (0.174) |
| $Log(\frac{M2}{GDP})$ | 0.415* | 0.501*** | 0.299 | 0.545** |
| | (0.220) | (0.190) | (0.264) | (0.221) |
| $Year * Log(\frac{M2}{GDP})$ | | | | -0.444 |
| | | | | (0.343) |
| K Open | 0.337*** | 0.282 | 0.310*** | 0.245*** |
| | (0.0688) | (0.210) | (0.0767) | (0.0944) |
| Anti-Corruption | -0.00850 | 0.0318 | -0.000164 | -0.0538 |
| | (0.0461) | (0.0596) | (0.0522) | (0.0838) |
| Crisis Events | 0.163 | -0.0682 | 0.115 | 0.148 |
| | (0.172) | (0.179) | (0.121) | (0.117) |
| Year Dummy | | | 0.298* | 2.159 |
| | | | (0.158) | (1.536) |
| Constant | -5.145*** | -1.443 | -4.820*** | -5.807*** |
| | (1.465) | (1.529) | (1.449) | (1.630) |
| Observations | 311 | 185 | 311 | 311 |
| R-squared | 0.909 | 0.928 | 0.912 | 0.914 |

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

**Table E.9:** *Advanced Economies:Instrument Variable and FPI*

Advanced Economies:Instrument Variable and FPI

| VARIABLES | (I) $\log(\frac{FPI}{GDP})$ | (II) $\log(\frac{FPI}{GDP})$ | (III) $\log(\frac{FPI}{GDP})$ | (IV) $\log(\frac{FPI}{GDP})$ |
|---|---|---|---|---|
| $\log(\frac{Trade}{GDP})$ | 3.123*** | 4.268*** | 2.780** | 2.885** |
| | (1.126) | (1.286) | (1.170) | (1.308) |
| $\log(\frac{GDP}{capita})$ | 7.78e-05*** | 4.15e-05*** | 5.92e-05*** | 5.83e-05*** |
| | (1.38e-05) | (7.53e-06) | (8.65e-06) | (8.50e-06) |
| ER Regime | 0.141 | -0.00431 | 0.119 | 0.126 |
| | (0.106) | (0.149) | (0.107) | (0.107) |
| ER Regime Volatility | 0.103 | 0.108 | -0.164 | -0.247 |
| | (0.499) | (0.422) | (0.333) | (0.384) |
| $Log(\frac{M2}{GDP})$ | 0.985* | 0.199 | 0.751 | 0.573 |
| | (0.528) | (0.315) | (0.489) | (0.492) |
| $Year * Log(\frac{M2}{GDP})$ | | | | 0.219 |
| | | | | (0.490) |
| K Open | 0.508*** | 0.419* | 0.438*** | 0.468*** |
| | (0.0622) | (0.243) | (0.0589) | (0.118) |
| Anti-Corruption | -0.211* | -0.130 | -0.191** | -0.165 |
| | (0.118) | (0.101) | (0.0832) | (0.125) |
| Crisis Events | 0.325 | 0.123 | 0.197 | 0.191 |
| | (0.263) | (0.228) | (0.217) | (0.201) |
| Year Dummy | | | 0.734*** | -0.189 |
| | | | (0.257) | (2.283) |
| Constant | -4.538 | 2.571 | -3.939 | -3.207 |
| | (2.861) | (3.067) | (2.610) | (3.168) |
| Observations | 299 | 185 | 299 | 299 |
| R-squared | 0.926 | 0.885 | 0.936 | 0.936 |

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

APPENDIX F

# APPENDIX CHAPTER 3 D: COMPARISON

**Table F.1:** *Effects on Total Assets*

| Variable | Specification | Detrend Non-IV Emerging | Trend Non-IV Emerging | Detrend IV Emerging | Trend IV Emerging |
|---|---|---|---|---|---|
| GDP per capita | I | -6.99e-06 | **3.32e -05***** | 1.23e-06 | **6.88e-05**** |
| | II | -4.15e-05 | 2.97e-05 | -8.22e-06 | 3.83e-0.5 |
| | III | -2.57e-05 | -6.82e-06 | -1.71e-05 | -1.28e-05 |
| | IV | -1.69e-05 | -1.47e-06 | -8.58e-06 | -6.47e-06 |
| ER Volatility | I | **-0.000314***** | **-0.000435***** | **-0.000272***** | **-0.00310***** |
| | II | **-0.00715*** | -0.00594000 | **-0.00668*** | -0.00594 |
| | III | **-0.000464***** | **-0.000537***** | **-0.000417***** | **-0.000436***** |
| | IV | **-0.000454***** | **-0.000522***** | **-0.000417***** | **-0.000433***** |
| log($\frac{Debt}{GDP}$) | I | **-0.237**** | **-0.279**** | **-0.265***** | **-0.291**** |
| | II | 0.06170000 | 0.05130000 | 0.02940000 | -0.0337 |
| | III | **-0.324***** | **-0.324***** | **-0.345***** | **-0.345***** |
| | IV | **-0.237***** | **-0.240***** | **-0.260***** | **-0.254***** |
| Year * log($\frac{Debt}{GDP}$) | I | | | | |
| | II | | | | |
| | III | **0.171**** | **0.152**** | **0.161*** | **0.162**** |
| | IV | | | | |
| K Open | I | **0.0663*** | 0.07620000 | **0.0863*** | **0.0972*** |
| | II | -0.0348 | 0.00578000 | -0.0141 | 0.01340000 |
| | III | **0.0666*** | **0.0672*** | **0.0855*** | **0.0853*** |
| | IV | **0.0643*** | **0.0655*** | **0.0821*** | **0.0810*** |
| ER Regime | I | 0.04480000 | 0.11200000 | 0.01810000 | 0.03860000 |
| | II | 0.03590000 | 0.01430000 | -0.000543 | -0.0282 |
| | III | 0.04200000 | 0.06200000 | 0.01680000 | 0.02210000 |
| | IV | 0.04220000 | 0.06760000 | 0.01920000 | 0.02300000 |
| Anti-Corruption | I | **-0.0969*** | **-0.0832*** | -0.04700000 | -0.0247 |
| | II | 0.02980000 | -0.0496 | 0.03220000 | 0.00820000 |
| | III | **-0.140**** | **-0.142***** | -0.0906 | -0.0891 |
| | IV | **-0.125**** | **-0.124**** | -0.0796 | -0.0782 |
| Crisis Year | I | **-0.203**** | **-0.181**** | **-0.197***** | **-0.186**** |
| | II | **-0.157**** | **-0.128*** | **-0.146**** | **-0.129*** |
| | III | **-0.199***** | **-0.193***** | **-0.194***** | **-0.193***** |
| | IV | **-0.199***** | **-0.193***** | **-0.194***** | **-0.193***** |
| Trade Openness | I | **0.638**** | **0.930***** | **1.224**** | **1.531***** |
| | II | **0.617**** | **1.268***** | 1.27500000 | **1.883***** |
| | III | **0.613**** | **0.681***** | **1.169**** | **1.189***** |
| | IV | **0.625***** | **0.674***** | **1.134**** | **1.112***** |
| log($\frac{M2}{GDP}$) | I | **0.646***** | **0.823***** | **0.562*** | **0.612**** |
| | II | **0.489***** | **0.656***** | 0.36400000 | 0.36800000 |
| | III | **0.685***** | **0.751***** | **0.604***** | **0.616**** |
| | IV | **0.659**** | **0.676**** | **0.573*** | **0.557*** |
| Year * log($\frac{M2}{GDP}$) | I | | | | |
| | II | | | | |
| | III | | | | |
| | IV | 0.05710000 | 0.10300000 | 0.07480000 | 0.10700000 |
| Year | I | -0.0208 | | -0.0212 | |
| | II | -0.00437 | | -0.00452 | |
| | III | **-0.0423**** | | **-0.0419**** | |
| | IV | **-0.0420**** | | **-0.0412**** | |

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Specification I is based on the sample from 1970-2007
Specification II is based on the sample from 1990-2007
Specification III is based on a sample from 1970-2007 with a year dummy and interaction term with debt variable
Specification IV is based on a sample from 1970-2007 with a year dummy and interaction term with M2 variable

**Table F.2:** *Effects on FX*

| Variable | Specification | Detrend Non-IV Emerging | Trend Non-IV Emerging | Detrend IV Emerging | Trend IV Emerging |
|---|---|---|---|---|---|
| GDP per capita | I | -3.25e-05 | 3.71e-05 | -3.23e-05 | -1.11e-05 |
| | II | -2.60e-05 | 2.91e-05 | 2.84E-05 | 3.89E-05 |
| | III | -4.87e-05 | -4.25e-05 | -4.82e-05 | -5.69e-05 |
| | IV | -3.88e-05 | -3.32e-05 | -3.77e-05 | -4.57e-05 |
| ER Volatility | I | **-0.000281*** ** | **-0.0000395*** ** | **-0.000253** ** | **-0.000283** ** |
| | II | -0.00889 | -0.00805 | -0.00818 | -0.00803 |
| | III | **-0.000439*** ** | **-0.000464*** ** | **-0.000412*** ** | **-0.000388*** ** |
| | IV | **-0.000467*** ** | **-0.000497*** ** | **-0.000446*** ** | **-0.000426*** ** |
| log($\frac{Debt}{GDP}$) | I | **-0.284*** ** | **-0.326*** ** | **-0.318*** ** | **-0.338*** ** |
| | II | -0.0127 | -0.0825 | -0.0541 | -0.0657 |
| | III | **-0.321*** ** | **-0.323*** ** | **-0.348*** ** | **-0.350*** ** |
| | IV | **-0.274*** ** | **-0.269*** ** | **-0.300*** ** | **-0.283*** ** |
| Year * log($\frac{Debt}{GDP}$) | I | | | | |
| | II | | | | |
| | III | 0.0822 | 0.0814 | 0.0804 | 0.102 |
| | IV | | | | |
| K Open | I | 0.0541 | 0.065 | 0.088 | 0.098 |
| | II | -0.0658 | -0.037 | -0.0331 | -0.0274 |
| | III | 0.0485 | 0.0486 | 0.0771 | 0.0734 |
| | IV | 0.0506 | 0.0499 | 0.0779 | 0.0712 |
| ER Regime | I | -0.0219 | 0.0255 | -0.0647 | -0.0585 |
| | II | 0.0138 | -0.00358 | -0.0479 | -0.054 |
| | III | -0.0223 | -0.0165 | -0.0582 | -0.0615 |
| | IV | -0.0170 | -0.0108 | -0.0506 | -0.0498 |
| Anti-Corruption | I | -0.0795 | -0.0551 | -0.0157 | 0.00417 |
| | II | -0.0292 | -0.0856 | -0.0196 | -0.0263 |
| | III | **-0.123*** | **-0.123*** ** | -0.069 | -0.073 |
| | IV | **-0.114*** | -0.109 | -0.0629 | -0.0652 |
| Crisis Year | I | **-0.288*** ** | **-0.275*** ** | **-0.284*** ** | **-0.279*** ** |
| | II | **-0.175*** | **-0.155*** | **-0.159*** | **-0.156*** |
| | III | **-0.279*** ** | **-0.277*** ** | **-0.276*** ** | **-0.279*** ** |
| | IV | **-0.276*** ** | **-0.275*** ** | **-0.273*** ** | -0.276*** |
| Trade Openness | I | **0.659** ** | **0.922*** ** | **1.409*** ** | **1.635*** ** |
| | II | **0.633** ** | **1.134*** ** | 1.732 | **1.865*** ** |
| | III | **0.646*** | **0.670*** ** | **1.275** ** | **1.180*** ** |
| | IV | **0.652*** | **0.649*** ** | **1.243** ** | **1.099** ** |
| log($\frac{M2}{GDP}$) | I | **0.651*** ** | **0.852*** ** | **0.564*** ** | **0.609*** ** |
| | II | **0.392*** | **0.526** ** | 0.176 | 0.18 |
| | III | **0.697*** ** | **0.722*** ** | **0.624*** ** | **0.596*** ** |
| | IV | **0.612** ** | **0.595** ** | **0.532*** | **0.486*** |
| Year * log($\frac{M2}{GDP}$) | I | | | | |
| | II | | | | |
| | III | | | | |
| | IV | 0.138 | 0.18 | 0.153 | 0.178 |
| Year | I | -0.000455 | | -0.00525 | |
| | II | 0.0189 | | 0.0201 | |
| | III | **-0.0276*** | | -0.0311 | |
| | IV | **-0.0257*** | | -0.0287 | |

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Specification I is based on the sample from 1970-2007

Specification II is based on the sample from 1990-2007

Specification III is based on a sample from 1970-2007 with a year dummy and interaction term with debt variable

Specification IV is based on a sample from 1970-2007 with a year dummy and interaction term with M2 variable

**Table F.3:** *Effects on FDI*

| Variable | Specification | Detrend Non-IV Emerging | Trend Non-IV Emerging | Detrend IV Emerging | Trend IV Emerging |
|---|---|---|---|---|---|
| GDP per capita | I | 0.000203 | **0.000344*** ** | **0.000219*** | **0.000322*** ** |
| | II | 6.88e-05 | **0.000172*** ** | 0.00011 | **0.000183*** ** |
| | III | 0.000184 | **0.000244** ** | **0.000205*** | **0.000260*** ** |
| | IV | 0.00017 | **0.000232** ** | **0.000197*** | **0.000252*** ** |
| ER Volatility | I | -0.0131 | -0.00712 | -0.0122 | -0.00779 |
| | II | 0.00403 | 0.00563 | 0.00454 | 0.0056 |
| | III | -0.0128 | -0.00951 | -0.0118 | -0.00896 |
| | IV | -0.00920 | -0.00656 | -0.00846 | -0.00613 |
| log($\frac{Debt}{GDP}$) | I | -0.188 | **-0.357*** | 0.216 | **-0.347*** ** |
| | II | -0.0299 | -0.162* | -0.0618 | -0.0144 |
| | III | **-0.425** ** | **-0.487*** | **-0.448*** | **-0.499*** ** |
| | IV | -0.197 | **-0.326** ** | -0.233 | **-0.339*** ** |
| Year * log($\frac{Debt}{GDP}$) | I | | | | |
| | II | | | | |
| | III | **0.381*** | 0.284 | 0.369 | 0.283 |
| | IV | | | | |
| K Open | I | **-0.183*** | **-0.130** | **-0.163*** | -0.111 |
| | II | -0.0988 | -0.0395 | -0.0736 | -0.0307 |
| | III | **-0.185*** | **-0.163*** | **-0.162*** | -0.133 |
| | IV | **-0.201** ** | **-0.167*** | **-0.172*** | -0.132 |
| ER Regime | I | **0.240*** ** | **0.328*** ** | **0.222** ** | **0.256*** ** |
| | II | **0.126*** | **0.0927** | 0.0792 | 0.0367 |
| | III | **0.222** ** | **0.275*** ** | **0.203** ** | **0.227*** ** |
| | IV | **0.229*** ** | **0.269*** ** | **0.206** ** | **0.215*** ** |
| Anti-Corruption | I | -0.0340 | -0.0429 | 0.00796 | 0.048 |
| | II | 0.1 | -0.0148 | 0.106 | 0.0536 |
| | III | -0.0565 | -0.117 | -0.0052 | -0.0114 |
| | IV | -0.0474 | -0.124 | 0.00154 | -0.00105 |
| Crisis Year | I | 0.169 | 0.155 | 0.178 | 0.179 |
| | II | 0.162 | 0.191 | **0.171*** | 0.19 |
| | III | 0.181 | 0.15 | 0.192 | 0.177 |
| | IV | 0.153 | 0.138 | 0.168 | 0.169 |
| Trade Openness | I | **1.303*** ** | **2.066*** ** | **1.934*** | **3.075*** ** |
| | II | **0.787*** | **1.733*** ** | 1.614 | **2.542*** ** |
| | III | **1.273*** ** | **1.667*** ** | **1.994*** | **2.746*** ** |
| | IV | **1.186** ** | **1.638*** ** | **2.075*** | **2.875** ** |
| log($\frac{M2}{GDP}$) | I | 0.349 | 0.792 | 0.216 | 0.299 |
| | II | **0.983*** ** | **1.221*** ** | **0.821*** | **0.844*** |
| | III | 0.353 | 0.686 | 0.196 | 0.321 |
| | IV | **0.907*** | **1.150** ** | 0.658 | 0.703 |
| Year * log($\frac{M2}{GDP}$) | I | | | | |
| | II | | | | |
| | III | | | | |
| | IV | **-0.703** ** | **-0.599*** | **-0.628*** | -0.563 |
| Year | I | 0.0755 | | 0.0777 | |
| | II | 0.0409 | | 0.0412 | |
| | III | 0.0717 | | 0.0761 | |
| | IV | 0.0647 | | 0.0709 | |

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Specification I is based on the sample from 1970-2007

Specification II is based on the sample from 1990-2007

Specification III is based on a sample from 1970-2007 with a year dummy and interaction term with debt variable

Specification IV is based on a sample from 1970-2007 with a year dummy and interaction term with M2 variable

**Table F.4:** *Effects on FPI*

| Variable | Specification | Detrend Non-IV Emerging | Trend Non-IV Emerging | Detrend IV Emerging | Trend IV Emerging |
|---|---|---|---|---|---|
| GDP per capita | I | **-0.000125*** | **0.000112** | **-0.000129**** | 8.26e-05 |
| | II | -5.36e-05 | 3.88e-05 | -7.38e-05 | 4.07e-05 |
| | III | -0.000118 | -4.97e-06 | **-0.000125*** | -6.10e-06 |
| | IV | -0.000122 | -6.22e-06 | **-0.000125*** | -7.56e-06 |
| ER Volatility | I | **0.00130***** | **0.000642*** | **0.00130***** | **0.00761**** |
| | II | 0.00882 | 0.00803 | 0.00894 | 0.00805 |
| | III | **0.00138***** | **0.000725**** | **0.00138***** | **0.000823***** |
| | IV | **0.00136***** | **0.000730*** | **0.00136***** | **0.000895**** |
| log($\frac{Debt}{GDP}$) | I | -0.0237 | **-0.175*** | -0.0217 | -0.152 |
| | II | -0.0648 | -0.159 | -0.052 | -0.156 |
| | III | -0.2 | 0.129 | 0.196 | 0.15 |
| | IV | -0.0375 | -0.185 | -0.0364 | -0.168 |
| Year * log($\frac{Debt}{GDP}$) | I | | | | |
| | II | | | | |
| | III | **-0.366**** | **-0.468**** | **-0.354**** | **-0.482**** |
| | IV | | | | |
| K Open | I | **0.142*** | **0.0908** | **0.141**** | 0.108 |
| | II | 0.114 | 0.132 | 0.106 | **0.135*** |
| | III | **0.133*** | **0.0917** | **0.132*** | 0.101 |
| | IV | **0.115*** | **0.0679** | **0.115*** | 0.0779 |
| ER Regime | I | -0.0382 | 0.124 | -0.0297 | 0.0524 |
| | II | -0.00339 | -0.0195 | 0.0181 | -0.0311 |
| | III | -0.0342 | 0.0387 | -0.0239 | 0.00632 |
| | IV | -0.0346 | 0.0364 | -0.0305 | -0.0107 |
| Anti-Corruption | I | -0.102 | **-0.171*** | -0.11 | -0.121 |
| | II | -0.0676 | -0.156 | -0.0703 | -0.144 |
| | III | -0.0734 | **-0.175*** | -0.0854 | -0.136 |
| | IV | -0.126 | **-0.251*** | -0.13 | **-0.201*** |
| Crisis Year | I | -0.0862 | -0.00745 | -0.0863 | -0.0236 |
| | II | 0.0460 | 0.0802 | 0.0428 | 0.0782 |
| | III | -0.102 | -0.0725 | -0.102 | -0.0765 |
| | IV | -0.0854 | -0.0464 | -0.0856 | -0.0503 |
| Trade Openness | I | 0.371 | **1.478***** | 0.193 | **2.037***** |
| | II | 0.425 | **1.214***** | 0.0469 | 1.359 |
| | III | 0.427 | **1.071***** | 0.196 | **1.478***** |
| | IV | 0.44 | **1.123***** | 0.347 | **1.723**** |
| log($\frac{M2}{GDP}$) | I | 0.277 | 0.850** | 0.299 | 0.623 |
| | II | **0.825*** | **1.067***** | **0.896*** | 0.9995 |
| | III | 0.302 | 0.758** | 0.331 | 0.636 |
| | IV | **0.576**** | **1.155***** | **0.579**** | **1.037***** |
| Year * log($\frac{M2}{GDP}$) | I | | | | |
| | II | | | | |
| | III | | | | |
| | IV | -0.405 | -0.561 | -0.393 | -0.644 |
| Year | I | **-0.0693**** | | **-0.0689*** | |
| | II | **-0.0571*** | | **-0.0572*** | |
| | III | **-0.0726*** | | **-0.0726**** | |
| | IV | **-0.0717*** | | **-0.0717*** | |

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Specification I is based on the sample from 1970-2007

Specification II is based on the sample from 1990-2007

Specification III is based on a sample from 1970-2007 with a year dummy and interaction term with debt variable

Specification IV is based on a sample from 1970-2007 with a year dummy and interaction term with M2 variable

**Table F.5:** *Effects on Total Assets*

| Variable | Specification | Non-IV Industrial | Non-IV Emerging | IV Industrial | IV Emerging |
|---|---|---|---|---|---|
| $log(\frac{GDP}{Population})$ | I | **3.37e − 05**$^{***}$ | **3.32e − 05**$^{***}$ | 3.70$e$ − 05 | **6.88e − 05**$^{**}$ |
| | II | **2.13e − 05**$^{***}$ | 2.97$e$ − 05 | **1.91e − 05**$^{***}$ | 3.83$e$ − 05 |
| | III | **2.74e − 05**$^{***}$ | −6.82$e$ − 06 | **2.81e − 05**$^{***}$ | −1.28$e$ − 05 |
| | IV | **2.70e − 05**$^{***}$ | −1.47$e$ − 06 | **2.71e − 05**$^{***}$ | −6.47$e$ − 06 |
| ER Volatility | I | −0.109 | **−0.000435**$^{***}$ | −0.212 | **−.000310**$^{***}$ |
| | II | −0.0555 | −.00594 | **−0.426**$^{*}$ | −0.00594 |
| | III | −0.186 | **−0.000537**$^{***}$ | **−0.426**$^{*}$ | **−.000436**$^{***}$ |
| | IV | −0.207 | **−0.000522**$^{***}$ | **−0.286**$^{***}$ | **−0.000433**$^{***}$ |
| $log(\frac{Debt}{GDP})$ | I | | **−0.279**$^{**}$ | | **−0.291**$^{**}$ |
| | II | | 0.0513 | | −0.0337 |
| | III | | **−0.324**$^{***}$ | | **−0.345**$^{***}$ |
| | IV | | **−0.240**$^{***}$ | | **−0.254**$^{***}$ |
| $Year * log(\frac{Debt}{GDP})$ | I | | | | |
| | II | | | | |
| | III | | **0.152**$^{**}$ | | **0.162**$^{**}$ |
| | IV | | | | |
| K Open | I | **0.229**$^{***}$ | 0.0762 | **0.236**$^{***}$ | **0.0972**$^{*}$ |
| | II | 0.178 | 0.00578 | 0.227 | 0.0134 |
| | III | **0.204**$^{***}$ | **0.0672**$^{*}$ | **0.217**$^{***}$ | **0.0853**$^{*}$ |
| | IV | **0.211**$^{***}$ | **0.0655**$^{*}$ | **0.238**$^{***}$ | **0.0810**$^{*}$ |
| ER Regime | I | 0.0624 | 0.112 | **0.0560**$^{*}$ | 0.0386 |
| | II | −0.0860 | 0.0143 | −0.0845 | −0.0282 |
| | III | 0.0589 | 0.0620 | 0.0524 | 0.0221 |
| | IV | 0.0600 | 0.0676 | 0.0558 | 0.0230 |
| Anti-Corruption | I | −0.113 | **−0.0832**$^{*}$ | **−0.0895**$^{**}$ | −0.0247 |
| | II | **−0.121**$^{*}$ | −0.0496 | −0.0271 | 0.00820 |
| | III | −0.110 | **−0.142**$^{***}$ | **−0.0838**$^{*}$ | −0.0891 |
| | IV | −0.104 | **−0.124**$^{**}$ | −0.0670 | −0.0782 |
| Crisis Year | I | 0.0324 | **−0.181**$^{**}$ | 0.0922 | **−0.186**$^{**}$ |
| | II | −0.0897 | **−0.128**$^{*}$ | 0.0348 | **−0.129**$^{*}$ |
| | III | −0.0174 | **−0.93**$^{***}$ | 0.0596 | **−0.193**$^{***}$ |
| | IV | −0.0202 | **−0.193**$^{***}$ | 0.0495 | **−0.193**$^{***}$ |
| Trade Openness | I | **1.486**$^{***}$ | **0.903**$^{***}$ | **1.811**$^{***}$ | **1.531**$^{***}$ |
| | II | **1.953**$^{***}$ | **1.268**$^{***}$ | **3.150**$^{***}$ | **1.883**$^{***}$ |
| | III | **1.323**$^{***}$ | **0.681**$^{***}$ | **1.721**$^{***}$ | **1.189**$^{***}$ |
| | IV | **1.348**$^{***}$ | **0.674**$^{***}$ | **1.780**$^{***}$ | **1.112**$^{***}$ |
| $log(\frac{M2}{GDP})$ | I | **0.621**$^{***}$ | **0.823**$^{***}$ | **0.610**$^{***}$ | **0.612**$^{**}$ |
| | II | **0.375**$^{*}$ | **0.656**$^{***}$ | 0.329 | 0.368 |
| | III | **0.524**$^{***}$ | **0.751**$^{***}$ | **0.530**$^{***}$ | **0.616**$^{**}$ |
| | IV | **0.497**$^{***}$ | **0.676**$^{**}$ | **0.453**$^{***}$ | **0.557**$^{*}$ |
| $Year * log(\frac{M2}{GDP})$ | I | | | | |
| | II | | | | |
| | III | | | | |
| | IV | 0.0488 | 0.103 | 0.140 | 0.107 |

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Specification I is based on the sample from 1970-2007

Specification II is based on the sample from 1990-2007

Specification III is based on a sample from 1970-2007 with a year dummy and interaction term with debt variable

Specification IV is based on a sample from 1970-2007 with a year dummy and interaction term with M2 variable

**Table F.6:** *Effects on FX*

| Variable | Specification | Non-IV Industrial | Non-IV Emerging | IV Industrial | IV Emerging |
|---|---|---|---|---|---|
| $log(\frac{GDP}{Population})$ | I | $-1.47e-07$ | $3.71e-05$ | $-1.28e-06$ | $-1.11e-05$ |
| | II | $\mathbf{-2.40e-05}^{*}$ | $2.91e-05$ | $\mathbf{-2.76e-05}^{**}$ | $3.89e-05$ |
| | III | $-8.12e-06$ | $-4.25e-05$ | $-6.31e-06$ | $-5.69e-05$ |
| | IV | $-1.03e-05$ | $-3.32e-05$ | $-1.01e-05$ | $-4.57e-05$ |
| ER Volatility | I | −0.0923 | $\mathbf{-0.000395}^{***}$ | −0.353 | $\mathbf{-0.000283}^{**}$ |
| | II | −0.568 | −.00805 | $\mathbf{-1.178}^{*}$ | −0.00803 |
| | III | −0.190 | $\mathbf{-0.000464}^{***}$ | −0.427 | $\mathbf{-.000388}^{***}$ |
| | IV | −0.312 | $\mathbf{-0.000497}^{***}$ | −0.627 | $\mathbf{-0.000426}^{***}$ |
| $log(\frac{Debt}{GDP})$ | I | | $\mathbf{-0.326}^{***}$ | | $\mathbf{-0.338}^{***}$ |
| | II | | −0.0825 | | −0.0657 |
| | III | | $\mathbf{-0.323}^{***}$ | | $\mathbf{-0.350}^{***}$ |
| | IV | | $\mathbf{-0.269}^{***}$ | | $\mathbf{-0.283}^{***}$ |
| $Year * log(\frac{Debt}{GDP})$ | I | | | | |
| | II | | | | |
| | III | | 0.0814 | | 0.102 |
| | IV | | | | |
| K Open | I | $\mathbf{0.208}^{**}$ | 0.0650 | $\mathbf{0.227}^{***}$ | 0.0980 |
| | II | −0.00489 | −0.0370 | 0.0760 | −0.0274 |
| | III | $\mathbf{0.177}^{***}$ | 0.0486 | $\mathbf{0.208}^{***}$ | 0.0734 |
| | IV | $\mathbf{0.220}^{**}$ | 0.0499 | $\mathbf{0.282}^{***}$ | 0.0712 |
| ER Regime | I | −0.0294 | 0.0255 | −0.0457 | −0.0585 |
| | II | −0.0206 | −0.00358 | −0.0181 | −0.0540 |
| | III | −0.0338 | −0.0165 | −0.0492 | −0.0615 |
| | IV | −0.0271 | −0.0108 | −0.0370 | −0.0498 |
| Anti-Corruption | I | $\mathbf{-0.310}^{**}$ | −0.0551 | $\mathbf{-0.249}^{**}$ | 0.00417 |
| | II | $\mathbf{-0.335}^{***}$ | −0.0856 | $\mathbf{-0.179}^{**}$ | −0.0263 |
| | III | $\mathbf{-0.305}^{**}$ | $\mathbf{-0.123}^{***}$ | $\mathbf{-0.244}^{***}$ | −0.0730 |
| | IV | $\mathbf{-0.268}^{**}$ | −0.109 | $\mathbf{-0.182}^{*}$ | −0.0652 |
| Crisis Year | I | 0.169 | $\mathbf{-0.275}^{**}$ | 0.321 | $\mathbf{-0.279}^{***}$ |
| | II | −0.128 | $\mathbf{-0.155}^{*}$ | 0.0768 | $\mathbf{-0.156}^{*}$ |
| | III | 0.106 | $\mathbf{-0.277}^{***}$ | 0.289 | $\mathbf{-0.279}^{***}$ |
| | IV | 0.0893 | $\mathbf{-0.275}^{***}$ | 0.253 | $\mathbf{-0.276}^{***}$ |
| Trade Openness | I | $\mathbf{0.606}^{*}$ | $\mathbf{0.922}^{***}$ | 1.434 | $\mathbf{1.635}^{***}$ |
| | II | $\mathbf{1.324}^{**}$ | $\mathbf{1.134}^{***}$ | $\mathbf{3.297}^{**}$ | $\mathbf{1.865}^{***}$ |
| | III | 0.400 | $\mathbf{0.670}^{***}$ | 1.345 | $\mathbf{1.180}^{***}$ |
| | IV | $\mathbf{0.547}^{***}$ | $\mathbf{0.659}^{***}$ | 1.558 | $\mathbf{1.099}^{**}$ |
| $log(\frac{M2}{GDP})$ | I | 0.184 | $\mathbf{0.852}^{***}$ | 0.155 | $\mathbf{0.609}^{***}$ |
| | II | −0.380 | $\mathbf{0.526}^{**}$ | −0.455 | 0.180 |
| | III | 0.0606 | $\mathbf{0.722}^{***}$ | 0.0762 | $\mathbf{0.596}^{***}$ |
| | IV | −0.103 | $\mathbf{0.595}^{**}$ | −0.205 | $\mathbf{0.486}^{*}$ |
| $Year * log(\frac{M2}{GDP})$ | I | | | | |
| | II | | | | |
| | III | | | | |
| | IV | 0.294 | 0.180 | 0.507 | 0.178 |

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Specification I is based on the sample from 1970-2007

Specification II is based on the sample from 1990-2007

Specification III is based on a sample from 1970-2007 with a year dummy and interaction term with debt variable

Specification IV is based on a sample from 1970-2007 with a year dummy and interaction term with M2 variable

**Table F.7:** *Effects on FDI*

| Variable | Specification | Non-IV Industrial | Non-IV Emerging | IV Industrial | IV Emerging |
|---|---|---|---|---|---|
| $log(\frac{GDP}{Population})$ | I | **3.74e − 05**$^{***}$ | **0.000344**$^{***}$ | **3.80e − 05**$^{***}$ | **0.000322**$^{***}$ |
| | II | **1.72e − 05**$^{***}$ | **0.000172**$^{***}$ | **1.63e − 05**$^{**}$ | **0.000183**$^{***}$ |
| | III | **3.13e − 05**$^{***}$ | **0.000244**$^{**}$ | **3.05e − 05**$^{***}$ | **0.000260**$^{***}$ |
| | IV | **3.39e − 05**$^{***}$ | **0.000232**$^{**}$ | **3.38e − 05**$^{***}$ | **0.000252**$^{***}$ |
| ER Volatility | I | −0.149 | −0.00712 | −0.0163 | −0.00779 |
| | II | **−0.371**$^{***}$ | 0.00563 | **−0.520**$^{**}$ | 0.00560 |
| | III | −0.224 | −0.00951 | −0.125 | −0.00896 |
| | IV | −0.0751 | −0.00656 | 0.0505 | −0.00613 |
| $log(\frac{Debt}{GDP})$ | I | | **−0.357**$^{*}$ | | **−0.347**$^{***}$ |
| | II | | **−0.162**$^{*}$ | | −0.0144 |
| | III | | **−0.487**$^{*}$ | | **−0.499**$^{***}$ |
| | IV | | **−0.326**$^{**}$ | | **−0.339**$^{***}$ |
| $Year * log(\frac{Debt}{GDP})$ | I | | | | |
| | II | | | | |
| | III | | 0.284 | | 0.283 |
| | IV | | | | |
| K Open | I | **0.347**$^{**}$ | −0.130 | **0.337**$^{***}$ | −0.111 |
| | II | 0.262 | −0.0395 | 0.282 | −0.0307 |
| | III | **0.323**$^{***}$ | **−0.163**$^{*}$ | **0.310**$^{***}$ | −0.133 |
| | IV | **0.270**$^{**}$ | **−0.167**$^{*}$ | **0.245**$^{***}$ | −0.132 |
| ER Regime | I | **0.142**$^{***}$ | **0.328**$^{***}$ | **0.150**$^{***}$ | **0.256**$^{***}$ |
| | II | −0.132 | 0.0927 | −0.0132 | 0.0367 |
| | III | **0.138**$^{***}$ | **0.275**$^{***}$ | **0.145**$^{***}$ | **0.227**$^{***}$ |
| | IV | **0.130**$^{***}$ | **0.269**$^{***}$ | **0.134**$^{***}$ | **0.215**$^{***}$ |
| Anti-Corruption | I | 0.0222 | −0.0429 | −0.00850 | 0.0480 |
| | II | −0.00623 | −0.0148 | 0.0318 | 0.0536 |
| | III | 0.0256 | −0.117 | −0.000164 | −0.0114 |
| | IV | −0.0195 | −0.124 | −0.0538 | −0.00105 |
| Crisis Year | I | 0.241 | 0.155 | 0.163 | 0.179 |
| | II | −0.118 | 0.191 | −0.0682 | 0.190 |
| | III | 0.192 | 0.150 | 0.115 | 0.177 |
| | IV | 0.213 | 0.138 | 0.148 | 0.169 |
| Trade Openness | I | **0.960**$^{**}$ | **2.066**$^{***}$ | 0.539 | **3.075**$^{***}$ |
| | II | **1.552**$^{***}$ | **1.733**$^{***}$ | **2.035**$^{***}$ | **2.542**$^{***}$ |
| | III | **0.802**$^{*}$ | **1.667**$^{***}$ | 0.406 | **2.746**$^{***}$ |
| | IV | 0.622 | **1.638**$^{***}$ | 0.219 | **2.875**$^{**}$ |
| $log(\frac{M2}{GDP})$ | I | 0.400 | 0.729 | **0.415**$^{*}$ | 0.299 |
| | II | **0.502**$^{***}$ | **1.221**$^{***}$ | **0.501**$^{***}$ | **0.844**$^{*}$ |
| | III | 0.305 | 0.686 | 0.299 | 0.321 |
| | IV | **0.502**$^{**}$ | **1.150**$^{**}$ | **0.545**$^{**}$ | 0.703 |
| $Year * log(\frac{M2}{GDP})$ | I | | | | |
| | II | | | | |
| | III | | | | |
| | IV | −0.359 | **−0.599**$^{*}$ | −0.444 | −0.563 |

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Specification I is based on the sample from 1970-2007

Specification II is based on the sample from 1990-2007

Specification III is based on a sample from 1970-2007 with a year dummy and interaction term with debt variable

Specification IV is based on a sample from 1970-2007 with a year dummy and interaction term with M2 variable

**Table F.8:** *Effects on FPI*

| Variable | Specification | Non-IV Industrial | Non-IV Emerging | IV Industrial | IV Emerging |
|---|---|---|---|---|---|
| $log(\frac{GDP}{Population})$ | I | **7.77e − 05**$^{***}$ | 0.000112 | **7.78e − 05**$^{***}$ | $8.26e-05$ |
| | II | **4.47e − 05**$^{***}$ | $3.88e-05$ | **4.15e − 05**$^{***}$ | $4.07e-05$ |
| | III | **5.57e − 05**$^{***}$ | $-4.97e-06$ | **5.92e − 05**$^{***}$ | $-6.10e-06$ |
| | IV | **5.61e − 05**$^{***}$ | $-6.22e-06$ | **5.83e − 05**$^{***}$ | $-7.56e-06$ |
| ER Volatility | I | 0.332 | **0.000642**$^{*}$ | 0.103 | **0.00761**$^{**}$ |
| | II | **0.644**$^{*}$ | 0.00803 | 0.108 | 0.00805 |
| | III | 0.0659 | **0.000725**$^{**}$ | −0.164 | **0.000823**$^{***}$ |
| | IV | 0.111 | **0.000730**$^{*}$ | −0.247 | **0.000895**$^{**}$ |
| $log(\frac{Debt}{GDP})$ | I | | **−0.175**$^{*}$ | | −0.152 |
| | II | | −0.159 | | −0.156 |
| | III | | 0.129 | | 0.150 |
| | IV | | −0.185 | | −0.168 |
| $Year * log(\frac{Debt}{GDP})$ | I | | | | |
| | II | | | | |
| | III | | **−0.468**$^{**}$ | | **−0.482**$^{**}$ |
| | IV | | | | |
| K Open | I | **0.496**$^{***}$ | 0.0908 | **0.508**$^{***}$ | 0.108 |
| | II | 0.348 | 0.132 | **0.419**$^{*}$ | **0.135**$^{*}$ |
| | III | **0.411**$^{***}$ | 0.0917 | **0.438**$^{***}$ | 0.101 |
| | IV | **0.396**$^{**}$ | 0.0679 | **0.468**$^{***}$ | 0.0779 |
| ER Regime | I | 0.159 | 0.124 | 0.141 | 0.0524 |
| | II | −0.00652 | −0.0195 | −0.00413 | −0.0311 |
| | III | 0.137 | 0.0387 | 0.119 | 0.00632 |
| | IV | 0.134 | 0.0364 | 0.126 | −0.0107 |
| Anti-Corruption | I | **−0.268**$^{*}$ | **−0.171**$^{*}$ | **−0.211**$^{*}$ | −0.121 |
| | II | **−0.266**$^{**}$ | −0.156 | −0.130 | −0.144 |
| | III | **−0.258**$^{**}$ | **−0.175**$^{*}$ | **−0.191**$^{**}$ | −0.136 |
| | IV | **−0.273**$^{**}$ | **−0.251**$^{**}$ | −0.165 | **−0.201**$^{*}$ |
| Crisis Year | I | 0.170 | −0.00745 | 0.325 | −0.0236 |
| | II | −0.0575 | 0.0802 | 0.123 | 0.0782 |
| | III | −0.0159 | −0.0725 | 0.197 | −0.0765 |
| | IV | −0.0161 | −0.0464 | 0.191 | −0.0503 |
| Trade Openness | I | **2.323**$^{**}$ | **1.478**$^{***}$ | **3.123**$^{***}$ | **2.037**$^{***}$ |
| | II | **2.535**$^{***}$ | **1.214**$^{***}$ | **4.268**$^{***}$ | 1.359 |
| | III | **1.740**$^{**}$ | **1.071**$^{***}$ | **2.780**$^{**}$ | **1.478**$^{***}$ |
| | IV | **1.672**$^{**}$ | **1.123**$^{***}$ | **2.885**$^{**}$ | **1.723**$^{**}$ |
| $log(\frac{M2}{GDP})$ | I | **1.092**$^{*}$ | **0.850**$^{**}$ | **0.985**$^{*}$ | 0.623 |
| | II | 0.265 | **1.067**$^{***}$ | 0.199 | 0.9995 |
| | III | 0.838 | **0.758**$^{**}$ | 0.751 | 0.636 |
| | IV | 0.929 | **1.155**$^{***}$ | 0.573 | **1.037**$^{***}$ |
| $Year * log(\frac{M2}{GDP})$ | I | | | | |
| | II | | | | |
| | III | | | | |
| | IV | −0.111 | −0.561 | 0.219 | −0.644 |

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Specification I is based on the sample from 1970-2007

Specification II is based on the sample from 1990-2007

Specification III is based on a sample from 1970-2007 with a year dummy and interaction term with debt variable

Specification IV is based on a sample from 1970-2007 with a year dummy and interaction term with M2 variable

## BIBLIOGRAPHY


Aghion, P., Bacchetta, P., Ranciere, R., and Rogoff, K. (2006). Exchange rate volatility and productivity growth: The role of financial development. Working Paper 12117, National Bureau of Economic Research.

Aguiar, M. and Gopinath, G. (2005). Defaultable debt, interest rates and the current account. *Journal of International Economics*, 69(1):64–83.

Aizenman, J. (1992). Exchange rate flexibility, volatility and the patterns of domestic and FDI. IMF Working Papers 92/20, International Monetary Fund.

Aizenman, J. and Noy, I. (2005). FDI and trade - Two way linkages? Economics Study Area Working Papers 76, East-West Center, Economics Study Area.

Albuquerque, R. (2003). The composition of international capital flows: Risk sharing through foreign direct investment. *Journal of International Economics*, 61(2):353–383.

Alesina, A. and Tabellini, G. (1989). External debt, capital flight and political risk. *Journal of International Economics*, 27(34):199 – 220.

Alfaro, L., Chanda, A., Kalemli-Ozcan, S., and Sayek, S. (2006). Foreign direct investment, financial markets and economic. 2006 meeting papers, Society for Economic Dynamics.

Ambler, S., Cardia, E., and Zimmermann, C. (2004). International business cycles: What are the facts? *Journal of Monetary Economics*, 51(2):257–276.

Asdrubali, P., Sorensen, B. E., and Yosha, O. (1996). Channels of interstate risk sharing: United States 1963-1990. *The Quarterly Journal of Economics*, 111(4).

Athanasoulis, S. G. and van Wincoop, E. (2000). Growth uncertainty and risk sharing. *Journal of Monetary Economics*, 45(3):477–505.

Backus, D. K., Kehoe, P. J., and Kydland, F. E. (1992). International real business cycles. *Journal of Political Economy*, 100(4):745–75.

Bai, Y. and Zhang, J. (2012). Financial integration and international risk sharing. *Journal of International Economics*, 86:17–32.

Beers, D. and Bhatia, A. (1999). Sovereign defaults: Hiatus in 2000? *S & P Credit Week*.

Bengui, J., Mendoza, E. G., and Quadrini, V. (2012). Capital mobility and international sharing of cyclical risk. Technical report.

Bennett, A., S., M. V. C., Schadler, S., and Kahn, R. B. (1993). Recent experiences with surges in capital inflows. IMF Occasional Papers 108, International Monetary Fund.

Bracke, T., Bussire, M., Fidora, M., and Straub, R. (2008). A framework for assessing global imbalances. Occasional Paper Series 78, European Central Bank.

Buiter, W. H. and Szegvari, I. (2002). Capital flight and capital outflows from Russia: Symptom, cause and cure. Working Papers 73, European Bank for Reconstruction and Development, Office of the Chief Economist.

Bulow, J. and Rogoff, K. (1989). Sovereign debt: Is to forgive to forget? *American Economic Review*, 79(1):43–50.

Calvo, G. A. (1996). Capital flows and macroeconomic management: Tequila lessons. *International Journal of Finance & Economics*, 1(3):207–23.

Canova, F. and Ravn, M. O. (1996). International consumption risk sharing. *International Economic Review*, 37(3):573–601.

Chang, R. and Velasco, A. (2001). A model of financial crises in emerging markets. Technical Report 2.

Chinn, M. and Ito, H. (2008). A new measure of financial openness. *Journal of Comparative Policy Analysis*, 10(3):309–322.

Chuhan, P., Claessens, S., and Mamingi, N. (1998a). Equity and bond flows to Latin America and Asia: The role of global and country factors. *Journal of Development Economics*, 55(2):439–463.

Chuhan, P., Claessens, S., and Mamingi, N. (1998b). Equity and bond flows to Latin America and Asia: The role of global and country factors. *Journal of Development Economics*, 55(2):439–463.

Collier, P., Hoeffler, A., and Pattillo, C. (1999). Flight capital as a portfolio choice. Policy Research Working Paper Series 2066, The World Bank.

Cuadra, G. and Sapriza, H. (2006). Sovereign default, terms of trade and interest rates in emerging markets. Technical report.

Cuadra, G. and Sapriza, H. (2008). Sovereign default, interest rates and political uncertainty in emerging markets. *Journal of International Economics*, 76(1):78–88.

Darby, J., Hughes Hallett, A. J., Ireland, J., and Piscitelli, L. (1998). The impact of exchange rate uncertainty on the level of investment. CEPR Discussion Papers 1896, C.E.P.R. Discussion Papers.

Demyanyk, Y., Ostergaard, C., and Sorensen, B. E. (2008). Risk sharing and portfolio allocation in EMU. European Economy - Economic Papers 334, Directorate General Economic and Monetary Affairs, European Commission.

Dooley, M. P. (1988). Capital flight: A response to differences in financial risks. *IMF Staff Papers*, 35(3):422–436.

Dooley, M. P. (1996). Capital controls and emerging markets. *International Journal of Finance & Economics*, 1(3):197–205.

Dooley, M. P., Fernandez-Arias, E., and Kletzer, K. M. (1994). Recent private capital inflows to developing countries: Is the debt crisis history? NBER Working Papers 4792, National Bureau of Economic Research, Inc.

Dornbusch, R., Fischer, S., and Samuelson, P. A. (1977). Comparative advantage, trade, and payments in a Ricardian model with a continuum of goods. *American Economic Review*, 67(5):823–39.

Easterly, W., Islam, R., and Stiglitz, J. E. (2000). Shaken and stirred: Explaining growth volatility.

Eaton, J. (1987). Public debt guarantees and private capital flight. Technical report.

Edison, H. J., Klein, M., Ricci, L. A., and Slok, T. (2002). Capital account liberalization and economic performance: Survey and synthesis. IMF Working Papers 02/120, International Monetary Fund.

Edison, H. J. and Warnock, F. E. (2003). A simple measure of the intensity of capital controls. *Journal of Empirical Finance*, 10(1-2):81–103.

Edwards, S. (1999). How effective are capital controls? *Journal of Economic Perspectives*, 13(4):65–84.

Edwards, S. (2001). Capital mobility and economic performance: Are emerging economies different? NBER Working Papers 8076, National Bureau of Economic Research, Inc.

Esquivel, G. and Larrain, F. B. (2002). The impact of G-3 exchange rate volatility on developing countries. G-24 Discussion Papers 16, United Nations Conference on Trade and Development.

Felices, G. and Orskaug, B.-E. (2008). Estimating the determinants of capital flows to emerging market economies: A maximum likelihood disequilibrium approach. Bank of England working papers 354, Bank of England.

Fernandez-Arias, E. and DEC (1994). The new wave of private capital inflows: Push or pull? Policy Research Working Paper Series 1312, The World Bank.

Fernandez-Arias, E. and Montiel, P. J. (1996). The surge in capital inflows to developing countries: An analytical overview. *World Bank Economic Review*, 10(1):51–77.

Fidora, M., Fratzscher, M., and Thimann, C. (2006). Home bias in global bond and equity markets - The role of real exchange rate volatility. Working Paper Series 685, European Central Bank.

Flood, R. P., Matsumoto, A., and Marion, N. P. (2009). International risk sharing during the globalization era. Technical report.

French, K. R. and Poterba, J. M. (1991). Investor diversification and international equity markets. *American Economic Review*, 81(2):222–26.

Froot, K. A. and Stein, J. C. (1991). Exchange rates and foreign direct investment: An imperfect capital markets approach. *The Quarterly Journal of Economics*, 106(4):1191–217.

Ghosh, A. R., Gulde, A. M., and Wolf, H. C. (2003). *Exchange Rate Regimes: Choices and Consequences*, volume 1 of *MIT Press Books*. The MIT Press.

Giovanni, J. d. (2005). What drives capital flows? The case of cross-border M&A activity and financial deepening. *Journal of International Economics*, 65(1):127–149.

Hansen, B. E. (1999). Threshold effects in non-dynamic panels: Estimation, testing, and inference. *Journal of Econometrics*, 93(2):345–368.

Haveman, J. D., Lei, V., and Netz, J. S. (2001). International integration and growth: A survey and empirical investigation. *Review of Development Economics*, 5(2):289–311.

Henry, P. B. (2007). Capital account liberalization: Theory, evidence, and speculation. *Journal of Economic Literature*, 45(4):887–935.

Hernandez, L. and Rudolph, H. (1994). Domestic factors, sustainability, and soft landing in the new wave of private capital inflows. Mimeo, The World Bank.

Hopenhayn, H. A. and Vereshchagina, G. (2009). Risk taking by entrepreneurs. *American Economic Review*, 99(5):1808–30.

Imbs, J. and Mauro, P. (2007). Pooling risk among countries. CEPR Discussion Papers 6461, C.E.P.R. Discussion Papers.

Islamaj, E. (2008). Financial integration and consumption smoothing: A survey.

Kalemli-Ozcan, S., Sorensen, B. E., and Yosha, O. (2003). Risk sharing and industrial specialization: Regional and international evidence. *American Economic Review*, 93(3):903–918.

Kant, C. (1996). Foreign direct investment and capital flight. Princeton studies in international economics, International Economics Section, Department of Economics Princeton University.

Khan, S. M. and Khan, Z. S. (2007). World investment report 2006, foreign direct investment from developing and transition economies: Implications for development by united nations conference on trade and development (UNCTAD). United nations publications, new york (2006). *Journal of Asian Economics*, 18(3):553–561.

Kose, M. A., Prasad, E., Rogoff, K. S., and Wei, S. J. (2006). Financial globalization: A reappraisal. NBER Working Papers 12484, National Bureau of Economic Research, Inc.

Kose, M. A. and Prasad, E. S. (2010). *Emerging Markets: Resilience and Growth Amid Global Turmoil*. The Brookings Institution Press, Washington DC.

Kose, M. A., Prasad, E. S., and Taylor, A. D. (2011). Thresholds in the process of international financial integration. *Journal of International Money and Finance*, 30(1):147–179.

Kose, M. A., Prasad, E. S., and Terrones, M. (2003). Volatility and comovement in a globalized world economy: An empirical exploration. IMF Working Papers 03/246.

Kose, M. A., Prasad, E. S., and Terrones, M. (2005). How do trade and financial integration affect the relationship between growth and volatility? Technical report.

Kose, M. A., Prasad, E. S., and Terrones, M. (2007). How does financial globalization effect international risk sharing: Patterns and channels. *Journal of Development Economics*.

Kose, M. A., Prasad, E. S., and Terrones, M. (2009). Does financial globalization promote risk sharing? *Journal of Development Economics*, 89(2):258–270.

Lane, P. and Burke, D. (2001). The empirics of foreign reserves. *Open Economies Review*, 12(4):423–434.

Lane, P. R. and Milesi-Ferretti, G. M. (2007). The external wealth of nations mark ii: Revised and extended estimates of foreign assets and liabilities, 1970-2004. *Journal of International Economics*, 73(2):223–250.

Levy, H. and Sarnat, M. (1970). International diversification of investment portfolios. *American Economic Review*, 60(4):668–75.

Lewis, K. (1999). Trying to explain home bias in equities and consumption. *Journal of Economic Literature*, 37(2):571–608.

Lizarazo, S. (2009). Contagion of financial crises in sovereign debt markets. Working papers, Centro de Investigacion Economica, ITAM.

Majd, S. and Pindyck, R. S. (1987). Time to build, option value, and investment decisions. *Journal of Financial Economics*, 18(1):7–27.

Malik, S. (2011). A model of risk sharing and default in emerging economies. Working paper, Cornell University.

Martinez, J. V. and Sandleris, G. (2011). Is it punishment? Sovereign defaults and the decline in trade. *Journal of International Money and Finance*, 30(6):909–930.

McLeod, D. (1993). Capital flight. The concise encyclopedia of economics, Library of Economics and Liberty.

Melitz, J. and Zumer, F. (1999). Interregional and international risk-sharing and lessons for EMU. *Carnegie-Rochester Conference Series on Public Policy*, 51(1):149–188.

Milesi-Ferretti, G. M. and Lane, P. R. (2003). International financial integration. The institute for international integration studies discussion paper series, IIIS.

Montiel, P. and Reinhart, C. M. (1999). Do capital controls and macroeconomic policies influence the volume and composition of capital flows? Evidence from the 1990s. *Journal of International Money and Finance*, 18(4):619–635.

Obstfeld, M. (1994a). Are industrial-country consumption risks globally diversified? Technical report.

Obstfeld, M. (1994b). Risk-taking, global diversification, and growth. *American Economic Review*, 84(5):1310–29.

Obstfeld, M., Shambaugh, J. C., and Taylor, A. M. (2010). Financial stability, the trilemma, and international reserves. *American Economic Journal: Macroeconomics*, 2(2):57–94.

Olivei, G. P. (2000). Consumption risk-sharing across G-7 countries. *New England Economic Review*.

Pakko, M. (1998). Characterizing cross-country consumption correlations. *The Review of Economics and Statistics*, 80(1):169–174.

Pineau, G. and Dorrucci, E. (2006). The accumulation of foreign reserves. Occasional Paper Series 43, European Central Bank.

Quinn, D. (1997). The correlates of change in international financial regulation. *The American Political Science Review*, 91(3):531–551.

Reinhart, C., Calvo, G., and Leiderman, L. (1993). Capital inflows and real exchange rate appreciation in Latin America: The role of external factors. MPRA Paper 7125, University Library of Munich, Germany.

Reinhart, C. M. and Rogoff, K. S. (2004). Serial default and the paradox of rich-to-poor capital flows. *American Economic Review*, 94(2):53–58.

Reinhart, C. M. and Rogoff, K. S. (2011). From financial crash to debt crisis. *American Economic Review*, 101(5):1676–1706.

Rodrik, D. (2006). The social cost of foreign exchange reserves. Working Paper 11952, National Bureau of Economic Research.

Schneider, B. (2003). Resident capital outflows: Capital flight or normal flows? A statistical interpretation. Working papers, Overseas Development Institute.

Sorensen, B. E., Wu, Y. T., Yosha, O., and Zhu, Y. (2007). Home bias and international risk sharing: Twin puzzles separated at birth. *Journal of International Money and Finance*, 26(4):587 – 605.

Sorensen, B. E. and Yosha, O. (1998). International risk sharing and European Monetary Unification. *Journal of International Economics*, 45(2):211–238.

Sung, H. and Lapan, H. E. (2000). Strategic foreign direct investment and exchange rate uncertainty. Staff general research papers, Iowa State University, Department of Economics.

Taylor, M. P. and Sarno, L. (1997). Capital flows to developing countries: Long and short-term determinants. *The World Bank Economic Review*, page 51470.

Tong, H. and Wei, S.-J. (2009). The composition matters: Capital inflows and liquidity crunch during a global economic crisis. NBER Working Papers 15207, National Bureau of Economic Research, Inc.

Velasco, A. (1987). Financial crises and balance of payments crises : A simple model of the southern cone experience. *Journal of Development Economics*, 27(1-2):263–283.

Yeyati, E. L. and Williams, T. (2011). Financial globalization in emerging economies:

Much ado about nothing? Business school working papers, Universidad Torcuato Di Tella.

Yue, V. Z. (2010). Sovereign default and debt renegotiation. *Journal of International Economics*, 80(2):176–187.